MOTOR AGE

Vol. XXIX
No. 25

CHICAGO, JUNE 22, 1916

Ten cents a copy
Three dollars a year

Makes A "Wash" Last For Weeks

DO you know that you can cut your washing and polishing bills in half—and at the same time keep your car like new with Johnson's Cleaner and Prepared Wax?

JOHNSON'S CLEANER

entirely removes all stains, discolorations, scum, road-oil, tar, grease—mud freckles and surface scratches you thought were permanent. And it doesn't injure or scratch the finest varnish—simply cleans and prepares it for the Wax polish.

JOHNSON'S PREPARED WAX

is the proper polish to use on your car. It preserves the varnish and protects it from the weather, adding years to its life. It covers up mars and scratches, prevents checking and "sheds water like a duck's back."

A Dust-Proof Polish

Johnson's Prepared Wax imparts a hard, dry, glass-like coating to which dust and dirt cannot adhere.

For Sale by Leading Garages and Accessory Dealers

After a dirty, dustry trip just wipe off your car—it isn't necessary to wash it. Many people even wax the **under side** of their fenders because the mud comes off so easily.

Use Coupon and Convince Yourself

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I enclose 10c for trial cans of Johnson's Cleaner and Prepared Wax—sufficient for a good test.

NAME .....

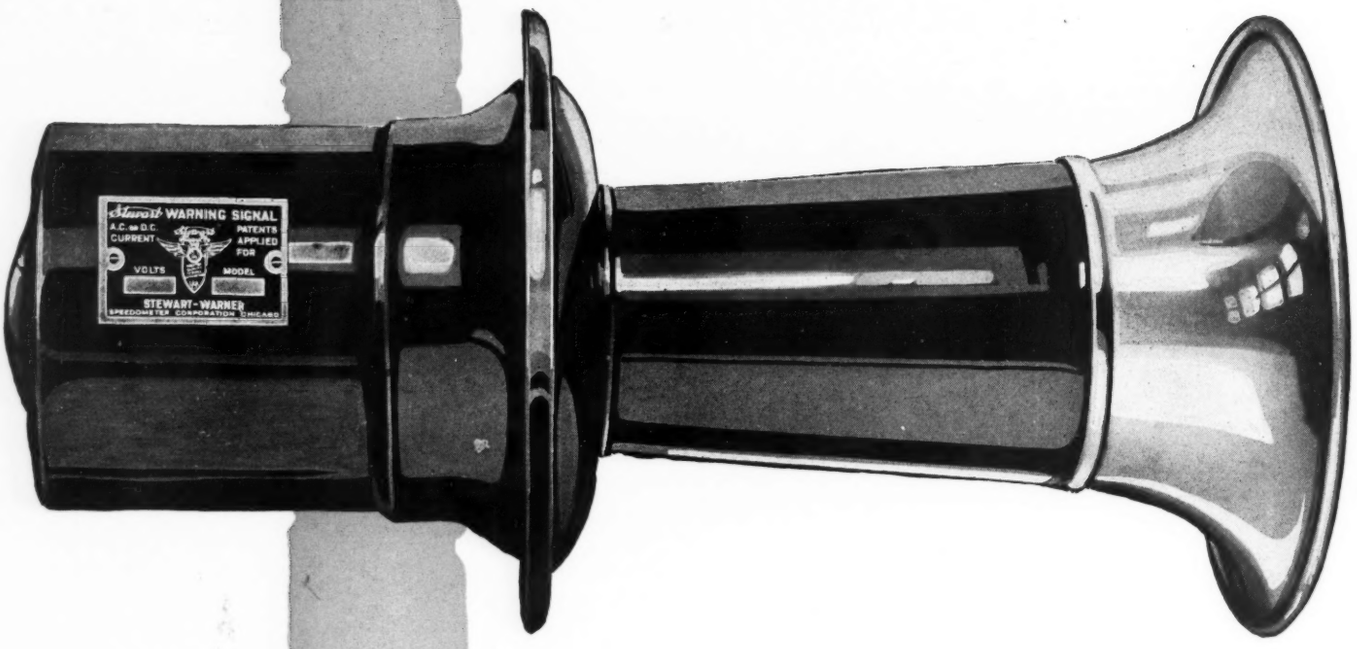
ADDRESS .....

CITY and STATE.....

MY DEALER IS.....

Stewart $6

Motor Driven Warning Signal



Some Orders—

Last week we took an order for 10,000 Stewart Warning Signals.

Only a couple of weeks ago we took another order for 40,000.

Several days ago we received one for 8,000.

And so it goes.

The Stewart Warning Signal is the recognized standard signal of the industry.

It has the quality and the "staying powers."

It's the fastest selling signal in America.

"No car is better than its accessories"

The Stewart-Warner Speedometer Corporation
Chicago, Ill., U. S. A.

MOTOR AGE

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ANNOUNCEMENTS

"Electrical Equipment of the Motor Car," the feature of the issue of Motor Age for June 29, is the opening number of a series of articles intended to enable the reader to care for, locate troubles on, and repair all the electrical systems in his car. This series will continue throughout the year, and while being in such form that it can be readily followed by the reader who, at the start, knows nothing of electricity, will be of immense value also to those whose knowledge of the subject is not so limited.

Next Week Motor Age Publishes the First of an Epoch Marking Series of Articles on

The Electrical Equipment of the Motor Car

Place a Standing Order with Your Newsdealer

See Page 64

Motor Age
Mallers Bldg., Chicago, Ill.

Why I am a Studebaker Dealer

After seven years' association with the Studebaker Company, I can say that at no time have I thought, nor could I be shown, when I could make more money with any other line. The co-operation of the Studebaker Sales and Service Departments has created such a feeling of satisfaction and confidence among the members of my sales organization that it inspires them to put forth their best efforts on sales and that is the profitable end of the Auto business.

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STUDEBAKER co-operation — that's the distinctive force that is daily attracting progressive dealers to the Studebaker line. Performance and tests have proved the *value* of Studebaker cars; in price they dominate the market; but it is the systematic co-operation given by the Studebaker Sales and Service departments that is bringing the dealer and buyer together for their mutual good.

Expressions such as the one reproduced above, from dealers who have sold Studebaker cars over a period of years, supply ample evidence of the wisdom of selecting Studebakers as a line on which to concentrate *your* selling efforts. Write for facts.

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South Bend, Indiana **Detroit, Michigan** **Walkerville, Ontario**

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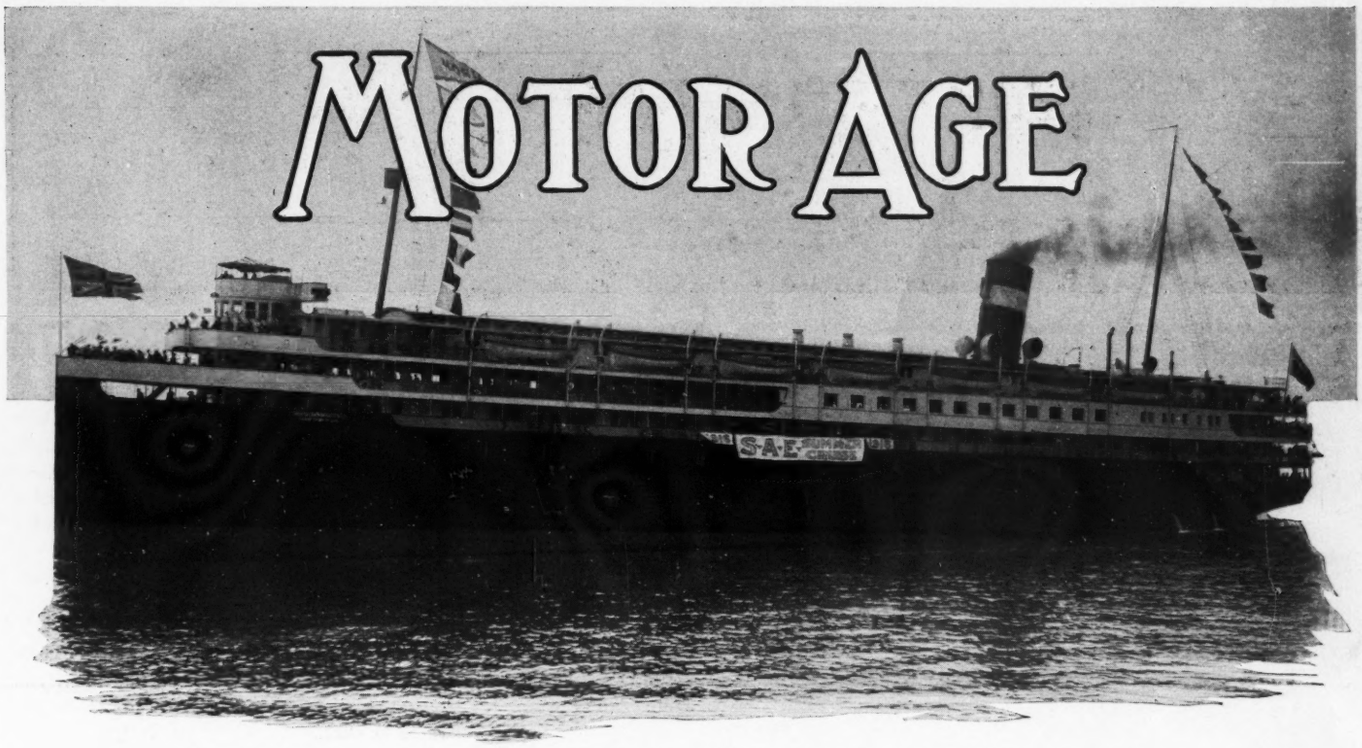
MOTOR AGE

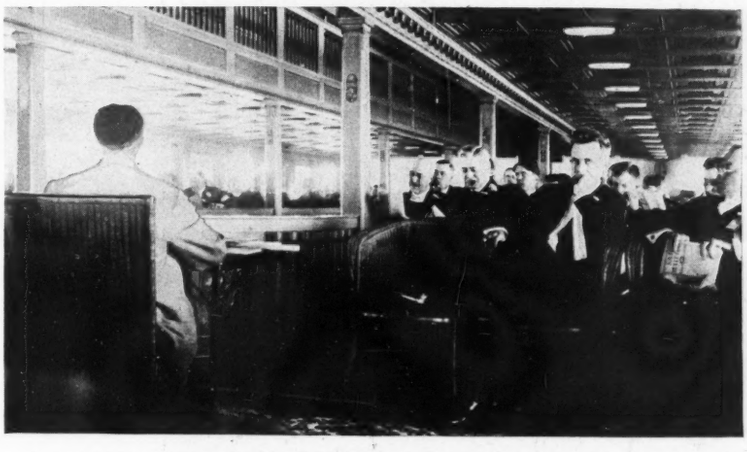


Steamer Noronic, as the floating convention hall of the motor car engineers during their summer meeting

What the S·A·E· Means to the Car Owner

By Darwin S. Hatch

Intimate Connection Between Work of Engineers and the User's Satisfaction



A professional session of the S. A. E. on board the Noronic, with President Russel Huff in the chair

Value to Motorists of Work of Standardization of Society Little Understood

LAST week 400 men went sailing—this week 200 car factories and twice as many parts plants are revamping their catalogues and parts lists and next year parts of one car will carry the same name as do the corresponding parts of all other cars. In the future, when you order parts for your car, or your repairman or dealer orders parts for your car, you will know what to ask for, and most of the confusion and delays of the past will be yours no longer.

Last week 400 men went sailing—this week car makers are in possession of the formula for a new steel alloy which will give longer life in certain parts of the car than will the alloys which are used at present. Not only that, but the car makers were told how to make sure they were getting that particular steel.

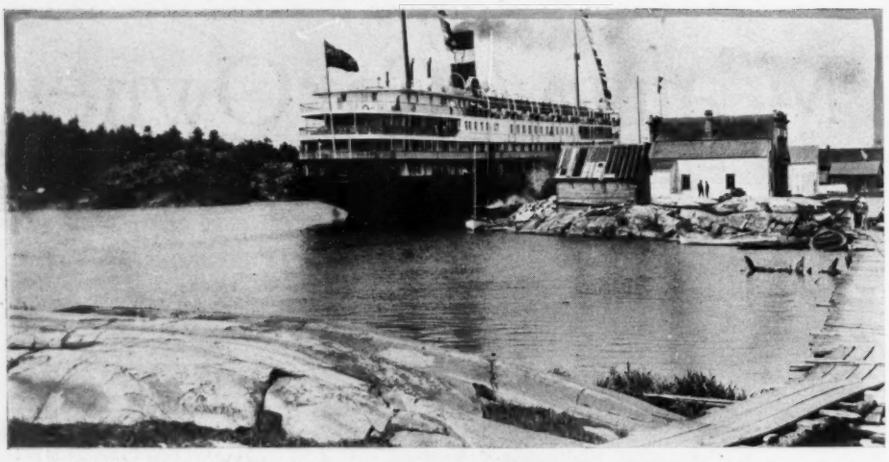
Both of these things, and others of equal importance to the motorist, came about directly through the fact that 400 men went sailing. The cruise of these modern Argonauts may never go down in history as has its Homeric predecesser, because it has become a regular thing. It is an annual affair, but each year sees a new crop of golden fleece brought back as a trophy of the voyage—a trophy more valuable than its fabled original was to Ulysses and his fellow travelers.

The men who sailed last week on the Noronic are the men who make your car possible; they are the men who are making the car possible for more and more of you every day; they are the men who are translating your ideas of what you want in a car into terms of steel and iron and bronze and leather. They are the engineers of the motor car and parts and accessory factories.

The golden fleece of new and better and less expensive ways of building cars is their trophy, gathered not from the hill-

Wives and daughters of engineers were much in evidence on summer cruise—The egg race at Killarney, the entrance to Georgian bay, was a feature of the one day given over to play in a week of work

Killarney, at the entrance of Georgian bay



Noronic docked at Killarney for a day of fishing

The start of the mid-summer cruise of the S. A. E. from Detroit amid waving flags and confetti streamers

sides of some far country, but from the interchange of ideas among themselves. Their voyage was a 5-day cruise of Lake Huron and Georgian Bay with their families.

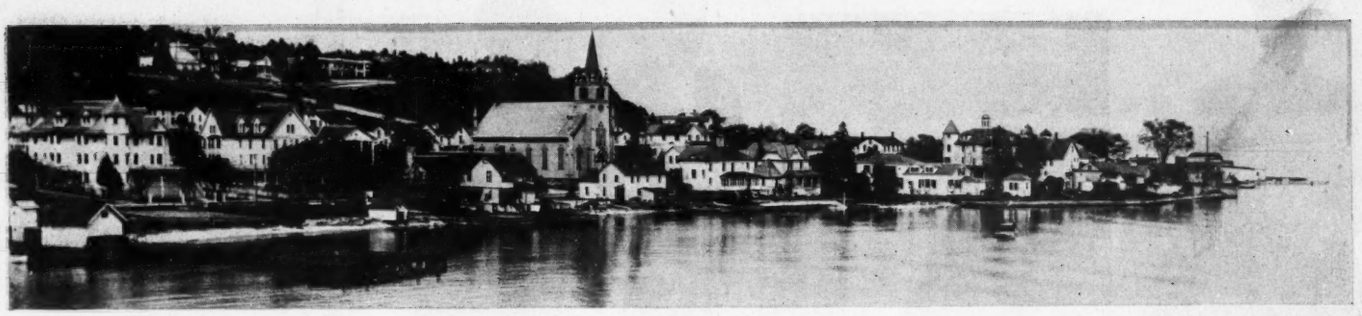
If you could see, as I saw, the designers of rival makes of cars with heads together over some intricate problem of design or manufacture, perhaps arguing the relative merits of two methods of reducing the number of milling machine operations on some little piece, and thus cutting a few cents from the cost of your car, you might believe that the age of trade secrets is past.

So far the most progressive of these engineers and their associates in the motor car industry have banded together into an association known as the Society of Automobile Engineers, an organization, to quote from its sheepskin, "whose object is to promote the arts and sciences connected with engineering and mechanical construction of automobile vehicles." The society was founded over 10 years ago by a number of engineers and manufacturers in the then baby industry, who found the need of exchanging ideas among one another. Even at that early date, the chief results accomplished were in the standardization of parts and practice. By this standardization is meant the determining by the different members of the industry what dimensions, shape and makeup of parts would be best suited to the needs of the industry as a whole when such parts could be so made to be made to conform to these specifications.

Standardization Most Prominent

It is this work of standardization which has been most prominent among the activities of the society and which is of the greatest benefit to the motor car manufacturer, dealer and user. Really, the user benefits most of all because it is through that standardization that it is made possible to produce a multiplicity of parts all interchangeable and thus cut down the cost of production, cut down the cost of replacement, and cut down the cost of changes.

It has been said that the motor car is the most emphatic example of present-day manufacturing methods. This is in part true and it is only by the interchangeability of parts that it has become possible for one factory to turn out hundreds of cars a day at very low cost, which means low price to the user, and turn them out in such shape that they are reliable, satis-



Mackinac, founded by the Jesuits and reminiscent of three races, crowds the shores as if to extend a welcome to visitors. One of the few cities in the world from which motor cars are excluded

factorily operating and comfortable road vehicles.

By interchangeability of parts is meant the making of many pieces from the same or similar machines which can be used to fit any one of hundreds of other parts, and which will go into place just as well as any other one similar to it without hand fitting or without further operation.

It is this interchangeability of parts in American manufacture which startled the European world several years ago when a number of cars of a certain American make were sent to Europe, torn down, the parts shuffled up, and an equal number of new cars built from the pile. Such a thing was unheard of in European practice. It is what has made the American motor car practicable and it is the American motor car engineers that have made this interchangeability possible by standardization.

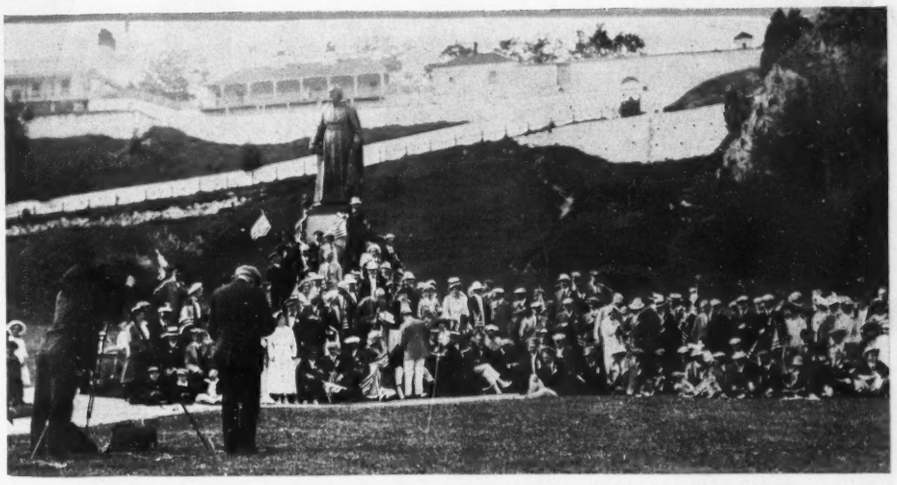
It is the chief function of the Society of Automobile Engineers to standardize the motor car in this way. Not so much that any one car may have its parts completely interchangeable, but that insofar as unnecessary differences in design, construction, size and material can be eliminated to make like parts and fittings of all manufacturers as nearly interchangeable as possible.

S. A. E. and Spark Plugs

If you were a motorist of some 10 or 12 years ago, you will recall the difficulty you had in finding spark plugs that would fit your cylinders. Your cylinder was bored and tapped for a screw thread of a certain size which, if you had the proper spark plug, would fit very nicely, but if you bought any other make of plug the chances were better than even that the spark plug would not fit, being either of the wrong diameter, the wrong length, or most probably having a wrong thread.

This was one of the earliest questions of standardization taken up by the Society of Automobile Engineers, and now, thanks to it, in any hamlet or village in the United States, may be obtained spark plugs which will fit any American-made motor. The S. A. E. thread has become universal in America.

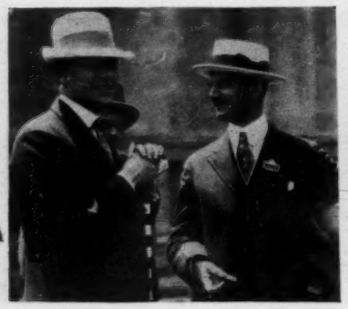
Three years ago if you wanted to take out your present magneto and put on another one of another make, you probably had to fill up or drill special holes in the plate on which it set, or magneto base. Within the past few years the Society of



Engineers and their friends pose for moving pictures at Mackinac island

Among the entertainment features of the cruise was a lifeboat drill by the Mackinac life-saving crew

The New York branch of the society, known as the Metropolitan section in parade leaving the boat for a half-day on Mackinac island



Above, R. M. Owen, of Owen Magnetic, and Al Reeves, general manager of N. A. C. C. At left, Howard Coffin, of Hudson

At left, G. W. Dunham, the probable next president of the S. A. E. At right, President Dorris, chief engineer Dorris company

Two Owens, of the Owen Magnetic

Albert Champion, of Champion spark plug, at right, and Foster, of Gabriel snubber, at left

Engineer Slade, who outlined military transport

Neil McCaul, who talked aviation engines

Russel Huff, president, S. A. E.

Chief Engineer Ferguson, of Pierce-Arrow

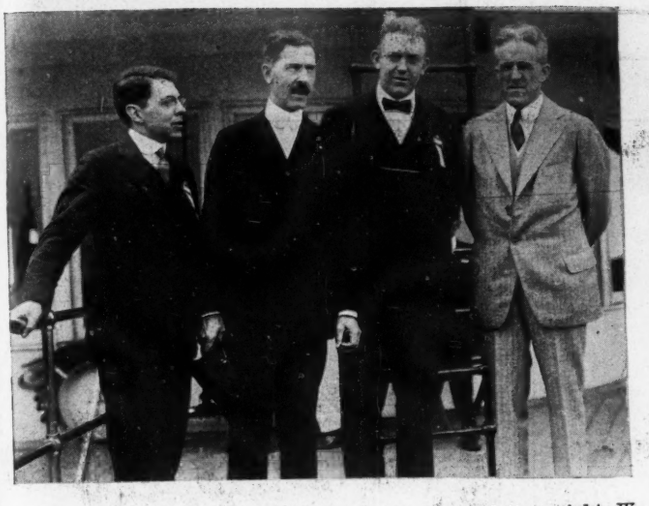
Perrin, who took active part

Herbert Chase, treasurer S. A. E.

Ray Harroun, engineer and former speedway champion, right, discusses ignition with Chief Engineer Kliesrath, of the Bosch company, left

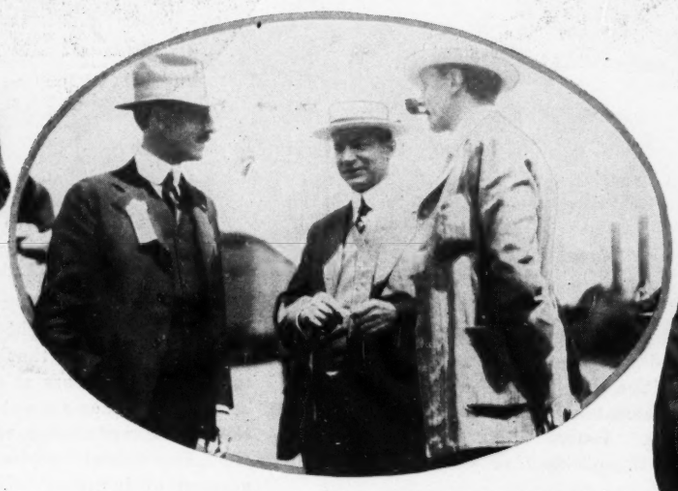
The new aviation committe. Left to right, Dr. H. C. Dickenson, Henry Souther and Lieut P. T. Young

Peter Frassee, of Peter Frassee & Sons



The meetings committee; from left to right, W. H. Conant, W. A. Brush, H. C. McComb and G. W. Dunham

A. L. McMurtry and Alfred Reeves discuss patent situation. At extreme right, J. E. Hale, who presented paper on tires and rims



At left, S. F. Kettering, of Delco, who mixed liquid air and wireless. Above, from left to right, Eugene Brush, Carl Vimmersheid, of General Motors, and A. Ludlow Clayden, chairman standards committee, all prominent in standards work

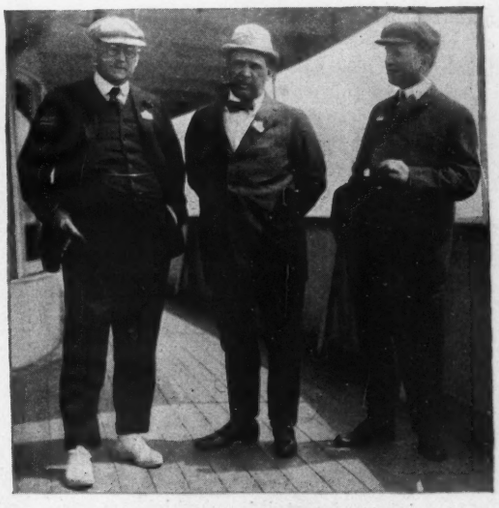
The active Mr. Brush, who discussed high-speed engines

Jesse Vincent, chief engineer of Packard company

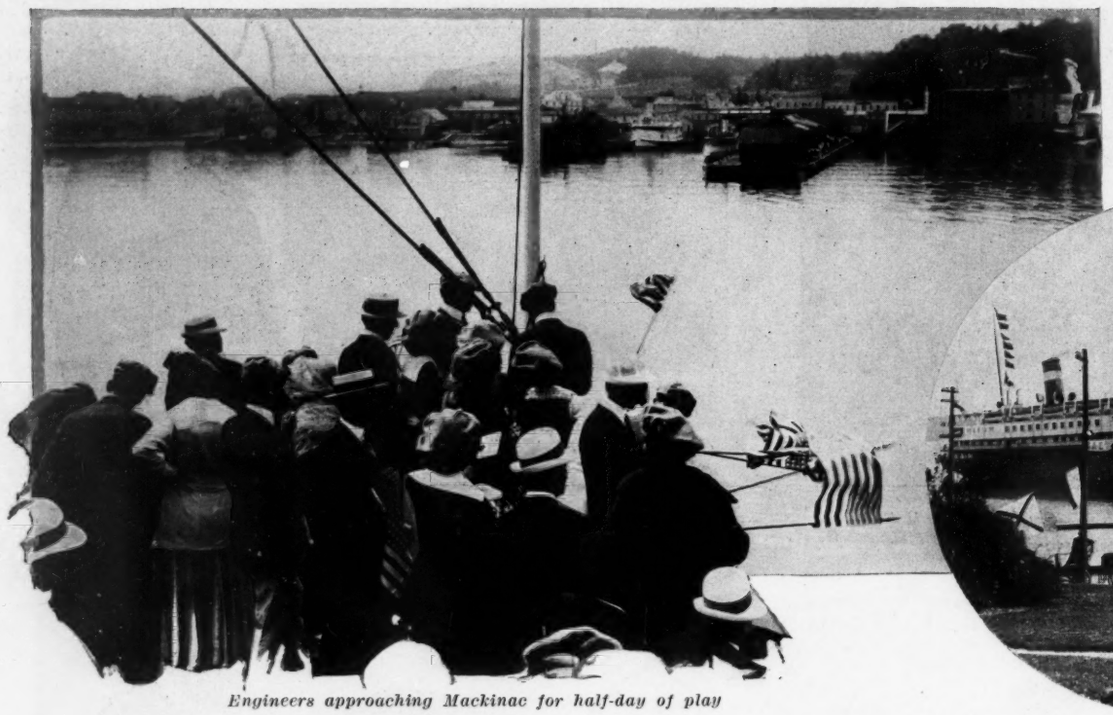
J. H. Wagenhorst, Goodrich engineer

Henry Hess, of Hess-Bright bearings, whose hobby is color photography

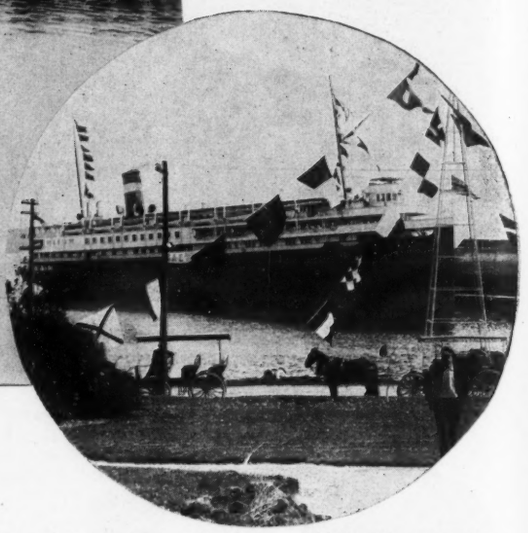
Messrs. Cramp, Chalfant and Moskovics



Three parts men, right to left, Webb Jay and Berne Nadall, of Stewart-Warner, and Major Hawkshurst, of Westinghouse



Engineers approaching Mackinac for half-day of play



The S. A. E floating convention at Mackinac

Automobile Engineers has standardized magneto bases so that any magneto of any manufacturer will fit the base upon which your present magneto fits.

A few years ago there were over a score of different sizes of tires, and the tire man had to carry in stock a few of all of these different sizes if he were to take care of his trade, the manufacturer had to have equipment to build and had to turn out all of these different sizes. Recently the Society of Automobile Engineers, through its Standards committee, has cut the number of tire sizes in two, so that now the dealer need carry only half as many sizes as he had previously, the manufacturer needs to build only half as many sizes as previously. This has resulted in a very distinct and decided reduction in the cost of tires. It has enabled money that has been put into duplicate equipment, differing only in size, into experimental work and into better manufacturing methods so that now tires of very much better grade may be obtained for less money.

The same thing is true throughout the entire car. Carbureters, carbureter controls, brakes and their control, the various parts of the engine, all have been standardized and given definite, exact sizes, within definite limits to thousandths of an inch to which the machinist may work, so that for a certain size and type of parts there is a certain specified gauge and size of each particular portion of that part.

Ordering Material

Further, the standards committee of the Society of Automobile Engineers, or rather the Society of Automobile Engineers, through its Standards committee, has made it possible for the manufacturer to order certain types of metal from which his car and parts are made and order them in a definite way so that he will be sure he is getting proper material for its particular work. This permits lighter, stronger and better wearing parts.

For instance, if a manufacturer found that he needed a certain type of nickel-chromiun-vanadium steel for a certain purpose, all he needs to order is an S. A. E. specification number. This will give the exact percentages of the different alloys needed and the maximum percentages of impurities which could be allowed, also the exact heat treatment required for the best service. Assume a manufacturer ordered S. A. E. specification 41-45. This would mean:

A nickel chromium-vanadium steel in which the percentage of vanadium is not less than 0.12 and phosphorus and sulphur not over 0.04; nickel, 1.25; chromium, 0.30 to 0.75 per cent; manganese, .50 to .80 per cent; and carbon, .40 to .50 per cent. This steel to be heat treated as follows: After forging or machining heat to 1,500-1,550 degrees Fahrenheit.

Arch Rock, a natural bridge on the island

Quench and reheat to 1,300-1,400 degrees Fahrenheit. Quench and reheat to 600-1,200 degrees Fahrenheit and cool slowly.

Practically all of the steel mills in the country are equipped to supply any alloy steel of this sort according to the S. A. E. specifications and by specification numbers.

This seems a long way from the user, but it is such foresight as this and such preparation as this that makes it possible to produce good cars at comparatively low cost, and produce a great many cars. What the car manufacturer wastes in rejected steel, in material sent back, or unusable on account of improper mixture or improper heat treating, what he loses on account of wrong sizes which either mean rejection or laborious hand fitting, what he loses in good will of the owner from improperly fitted parts, all add to his cost of production, and the more he can assure himself against such cost, the less intricateness the inspection service needed to produce the same results, and the more cheaply he may produce his car.

This Means Cheper Cars

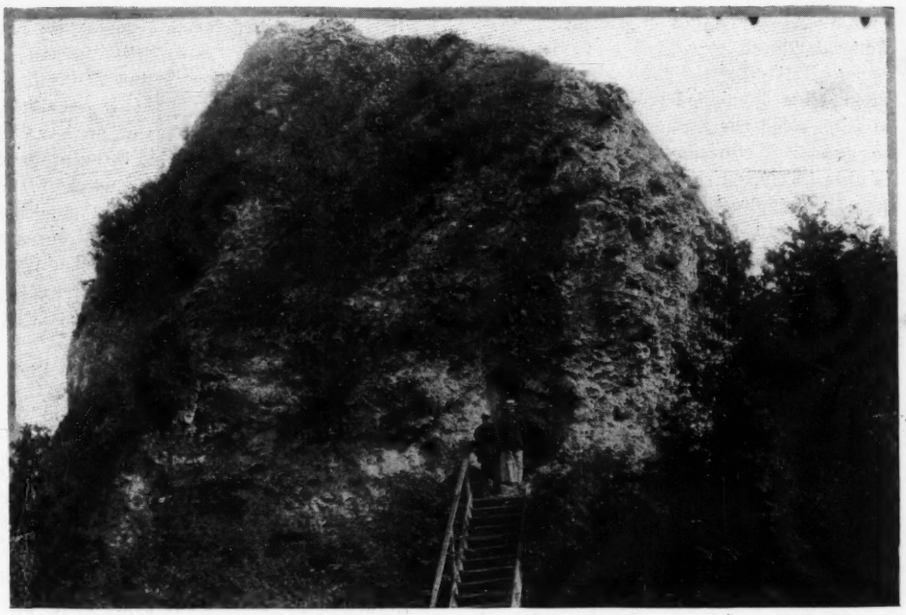
With these economies in the factory, lower cost to the consumer must follow.

It is in the hidden parts of the car that the Society of Automobile Engineers has demonstrated its work. The little things like bolts and nuts, lock washers, spark plug threads, etc., have all been standardized and this has reduced the cost of producing the car and in a like manner has reduced the cost to the purchaser and his upkeep expense upon it, and at the same time it has materially increased the quality and workmanship in the car.

All of the various standards and findings of the society are incorporated in a handbook known as the S. A. E. handbook, which is a loose-leaf form of engineer's pocket book. So far as I know, this is the only organization of its kind which has undertaken and carried such a compila-

tion of data sheets into effect in loose-leaf form. The sheets, in the preparation of which a great deal of detail has been involved, are furnished the members without cost in addition to the conventional dues. Revised and supplementary sheets are distributed twice a year, so that the engineers have up-to-date information at hand at all times.

Of course, it is impossible for the society to set standards for certain parts or procedure without a great deal of labor on the part of the members. This usually has its incipiency in the presentation of papers before either the mid-winter or the mid-summer sessions. In these papers the engineers present their views of the necessity for action on certain points or methods of procedure, with suggestions as to what should be done toward the arrangement of a standard. One of the subjects which have been under discussion of late is the commercial testing of engines, and a number of papers have been submitted on the subject. These papers are the work either of engineers from factories actually connected with engine testing work, commercially, or by the motor car department of some of the technical colleges whose laboratory experience is particularly valuable.



Sugar-loaf rock, a point of interest at Mackinac

Testing Standards

In testing mechanisms of any kind it is recognized that unless similar conditions of tests are provided and standard forms are provided so that the same data may be taken under similar conditions, comparative tests are valueless. Where it is possible to obtain tests under similar conditions from a number of engines of different makes for different sizes or different styles, it is then possible to determine exactly just what effect changes in carburetion, ignition, valve arrangement, timing, or any one of the thousands of factors which go into the operation of an engine.

The same thing is true when it comes to testing the car as a whole. The society at the moment is in the work of developing a series of tests for cars which may be called the car ability test. It is not known what name may be given this test but it is to determine just what a car can do in the way of carrying capacity, acceleration, economy, hill climbing, etc—in other words, the very factors upon which you would buy a car, with perhaps the exception of the personal considerations of comfort and outside appearance. Such questions as the fuel problem, headlight dimmers, and similar points of interest at the moment are under continual observation and undergoing work by the society. The fact that no hurried announcements are made shows that their investigations are thorough and painstaking before recommendations are made.

That the work of the society has a broader application than in helping the motorist along may be determined from the fact that the war department has twice called upon the society for conference work in connection with the army truck specifications, and that there are two past presidents of the S. A. E. on the naval consulting board, while a third is consulting engineer to the aviation corps of the navy department by government appointment, and Howard Coffin, a past president, is chairman of the industrial preparedness committee of the government.

The Standards committee has just taken up the standardization of aeronautic work, being urged to this by the government.

BUS LINE GETS FRANCHISE

Chicago, June 20—The Chicago Motor Bus Co. yesterday obtained from the Lincoln Park board a 15 years franchise giving it the exclusive right to operate motor buses on outside boulevards. The company has already been given a certificate of convenience and necessity by the Public Utilities commission and it was announced that the buses will be put into service within 6 months. The franchise provides for 10-cent fare and a seat for every passenger. The new line will traverse the Lake Shore drive, Lincoln park and Sheridan road and buses must be operated every 20 minutes.

YELLOWSTONE TOUR LIST GROWS

St. Paul, Minn., June 17—Four more entries were received for the sociability motor car tour to Yellowstone park the last week, bringing the total up to twenty motor car parties. W. W. Smith, chairman of the tour committee and president of the National Parks Highway Association, declared that fifty entrants would sign before July 10, the date of closing.

"There will be the allotted fifty cars ready to start for the western playground on July 20," is the prediction made by Mr. Smith. He says a good many motorists from eastern cities will join here and make the trip to Gardiner, Mont., next month, judging from the number of requests for information.

No motor cars are permitted on Mackinac island, but some of the roads are fine

Another Gas Substitute

Morrison Scheme Announced Same Day as that of Enricht

Said to Obtain Hydrogen in Different Way

NEW YORK, June 19—The very same day that Louis H. Enricht's gasoline substitute resulted in a contract closed with the Maxim Munitions Corp., a process for the same purpose was announced, discovered by Lewis Morrison II, grandson of the Lewis Morrison of "Faust" fame.

The Morrison scheme, like the Enricht plan, is one to operate the motor with hydrogen generated in the car. Enricht's plan decomposes the water to obtain hydrogen, While Morrison generates his hydrogen by the union of water and a chemical. In many ways there is much similarity in the two apparent operations. Morrison's theory is extremely simple, the chemicals used being ammonia and metallic sodium.

Explanation of Process

For purpose of explanation, Morrison suggests that an ordinary carbide acetylene gas generator be used to create the hydrogen. All of the necessary adjustments of the engine except the proper mixture adjustment of the carburetor needed to carry out the Morrison plan are the connecting of the gasoline feed pipe from the carburetor to the water intake of the generator in the connecting of the gas outlet of the generator to the intake of the carburetor. Instead of carbide, sodium is placed in the generator and the tank is filled with water into which has been poured a solution of ammonia.

The chemical action when the water comes in contact with the sodium is as follows:

Ammonia plus water plus sodium equals nitrate of soda and hydrogen.

That is, from one part of ammonia, three parts of water and one part of sodium, ten parts of hydrogen gas are obtained. The hydrogen passes into the cylinders and mixes with air at the intake valve. Exploded by the spark, it is reduced to water, nitrogen and other negligible gases. The water passes out the exhaust in a vapor so thin that it is no more noticeable than the moisture of the air.

To obtain the same horsepower, according to Mr. Morrison, from an engine operated by hydrogen as from gasoline, a larger volume of hydrogen would have to be used. He says that the efficiency of hydrogen is about a third that of gasoline.

After the hydrogen is released from the sodium, a by-product of commercial value, Chili saltpeter, is deposited in the generator. Mr. Morrison's scheme requires a special generator before it works perfectly. It would have to have a cone-shaped bottom so that the water would fall on the sodium all the time, and the speed of the drops would be in proportion to the amount of hydrogen burned.

FUEL QUIZ PROGRESSES

Washington, D. C., June 19—Special telegram—A new angle in the effort of the Federal Trade Commission to determine responsibility for the rapid rise in the price of gasoline developed today when the commission cited the Standard Oil Co. of Ohio to appear Wednesday to explain why it is able to charge several cents more a gallon for gasoline than is charged by its competitors. Commissioner Harris intimated the commission would inforce attendance of representatives of the company unless they attend voluntarily.

At last week's hearing the commission reached the conclusion, said Harris, that failure of the Standard company of Indiana to compete in Ohio territory permitted the higher prices there and was one of the underlying causes of the demoralization of the oil industry. He also intimated that the report may be turned over to the department of justice if evidence of any conspiracy to raise prices is found.

R. L. Welsh, Chicago, attorney for Western Oil Jobbers' Assn., said that when the price of gasoline first started upward last August and the scarcity became noticeable, the jobbers applied to the Standard Companies for gasoline. In every instance they were told Standard had none for sale. This intensified the shortage and compelled all independents to raise their price because of limited stocks.

The new element in gasoline situation, said Welsh, is that the Standard companies are binding up some of their customers with contracts requiring that they also purchase their lubricants from the Standard. Under agreement, these bound customers might be expected to have more favorable prices than outsiders, when Standard chose to give such prices, but these bound customers would necessarily be bound to Standard as to purchase of both gasoline and lubricants in the event of an increase, no matter how great.

USE GREENSTREET GASOLINE PROCESS

Port Hope, Ont., June 19—The Canadian Gasoline Corp., with a capital of $3,000,000, has acquired the Canadian patents for the Greenstreet process of gasoline manufacture. The company will be opened as a subsidiary of the Gasoline Corp. of the United States according to present plans. The syndicate financing the proposition is headed by H. T. Bush, president of the Standard Ideal Co., this city. Sir Donald Mann and Nathaniel Curry, president of the Canadian Car & Foundry Co., are represented in the syndicate.

Big Expansion for Stutz

Allan A. Ryan and Other Banking Interests Acquire 37,500 Shares

H. C. Stutz and H. F. Campbell Remain Secretary and Treasurer

INDIANAPOLIS, Ind., June 20—The Stutz Motor Car Co. is to be refinanced to permit of expansion. Allan A. Ryan & Co., with a number of banking associates, have acquired 37,500 shares of an issue of 75,000 shares of no par value to be brought out, it is expected, at $55 a share. The Stutz company has no preferred stock or bonded debt. Earnings for the current year are running between $600,000 and $800,000. Proceeds of the new financing will be used to provide for enlarged facilities.

H. C. Stutz and H. F. Campbell will be retained as president and treasurer respectively of the Stutz Motor Car Co., by the new interests. Other officers will be elected later at a meeting to be held in New York City.

The reputation of the product of this concern which was gained from the performance of its racing cars, has justified a greater organization for some time, and the ambitions of Harry Stutz, the designer and builder, are now bearing fruit in the new organization.

MILWAUKEE DEALERS CLOSE SUNDAYS

Milwaukee, Wis., June 17—Members of the Milwaukee Automobile Dealers, Inc., are mailing notices to their respective customers relative to the Sunday closing movement, which is now permanently in effect after a trial period of 2 weeks. A typical form of notice is that issued by the Mitchell Automobile Co., which says:

"In line with the modern welfare development, the Milwaukee Automobile Dealers' Association has adopted the rule of closing all departments of their business on Sunday, and we therefore desire to give our customers notice that in the future, our stockroom, salesroom, garage and repair shop will not be open for business on that day.

"We have, however, arranged temporarily, at least, to retain one man on duty from 9 a. m. to 6 p. m. on Sunday for the purpose only of answering telephone calls and giving advice on minor difficulties and rendering such assistance as possible in cases of accident or absolute breakdown."

NO KING SUMMER ANNOUNCEMENT

Detroit, Mich., June 17—Artemas Ward, jr., president of the King Motor Car Co., has issued a statement to King dealers that following the policy of the King Motor Car Co. of preceding years, this

company will make no mid-year announcement of new models or prices.

"The prevailing practice of mid-season announcements for the stimulation of sales," Mr. Ward's statement declares, "has a demoralizing effect on the entire industry. It causes a quick depreciation on all cars purchased during the first half of the year, and also retards the normal spring business, as buyers frequently wait for new models, which they know will be announced in the early summer. Dealers are also affected; in anticipation of early summer announcements they under order for spring business to avoid the risk of unsold stock when the new models are made public.

MOREHEAD HEADS N. Y. GOODRICH

New York City, June 19—H. J. Morehead has been appointed manager of the local branch of the B. F. Goodrich Co. Mr. Morehead entered the service of this company in 1905 at its Detroit branch as a salesman. In 1909 he succeeded H. C. Miller as manager there.

STUTZ FEATURES NEWARK'S NIGHT

Newark, N. J., June 17—J. W. Dickinson in a 110-hp. Stutz featured tonight's race meet in this city on the ½ mile dirt track at Olympic park held by the Olympic Park Automobile Racing Assn. under the direction of T. B. Shoemaker, former secretary of the A. A. A. contest board.

In the ½ mile time trials, Dickinson bettered the former track record by negotiating the distance in 37⅘ sec. An Adams Special, driven by G. W. Adams, won the 3 mile event for cars of 300-cu. in. and under, the time being 4:16⅘. Dickinson won the next 3 mile event, his time being 413⅘. He also won the 5 mile free-for-all in 6:46 with G. T. Theobald's Mercedes a close second.

The Australian pursuit race of 10 miles was featured by a close race between the Stutz and the Mercedes, so close in fact that a special match race between the two cars was run off and won by the Stutz.

DRASTIC PHILADELPHIA ORDINANCES

Philadelphia, Pa., June 17—Three ordinances, the most drastic of any having to do with motor traffic regulation, were introduced in the Philadelphia council last Thursday, by Director of Public Safety James P. Wilson. The following summary shows the extent of the unreasonable bills which are sure to arouse concerted action on the part of motor car owners in the Quaker City:

"No automobile will be allowed to remain on Broad street between Race and Spruce streets, known as Automobile Row, more than 30 minutes before 9 a. m. or after 6 p. m.

"No automobile wlil be allowed on these streets between 9 a. m. and 6 p. m. longer than is necessary to take on and discharge passengers."

Time limits are imposed on other streets in the congested traffic centers. For violations: $25 for the first offense; $50 for the second; $100 for the third.

Pedestrians crossing the streets prescribed will be arrested and fined $1 for each offense. Other provisions are for regulating lights, horns and danger signs.

FENDERS ON CHICAGO TRUCKS

Chicago, June 20—For the second time in the last two years, the Chicago city council passed an ordinance requiring fenders on motor trucks. The new ordinance becomes effective January 1, 1917, unless it is again repealed before that time.

The first law was held illegal by the courts and a new one has been drafted to meet technical objections. The real purpose of the ordinance seems to be rather vague in the minds of every one. The present reading of the ordinance states that every fender used on the trucks must follow a specified pattern.

Dealers' organizations and heavy users of motor trucks in this city, who were first influential in proving the original ordinance unconstitutional, are as thoroughly convinced of the unfairness of the new law and will probably strongly contest its adoption.

NOW BOUND BROOK OIL-LESS CO.

Bound Brook, N. J., June 19—The Graphite Lubricating Co. has altered its title to Bound Brook Oil-less Bearing Co., the better to indicate the nature of its business. Some confusion had resulted from the old title, which gave the impression that graphite greases, lubricates, etc., were produced, whereas the company produces only graphite and bronze oil-less bearings and nigrum-treated wood oil-less bearings.

COLE HAS TUXEDO ROADSTER

Indianapolis, Ind., June 19—The Cole Motor Car Co. is now among the class of motor car manufacturing concerns concentrating their efforts on the production of one chassis, thereby enabling them to offer their car in a wider variety of body types than heretofore.

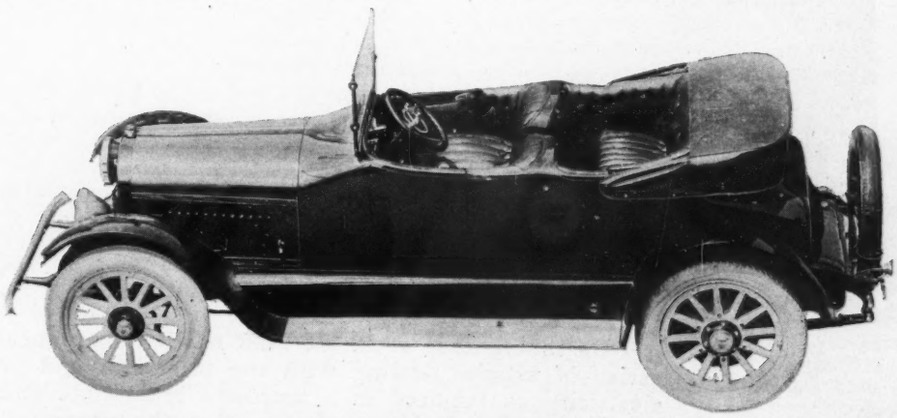
Distinctive among its new types is an eight-cylinder four-passenger Tuxedo roadster, which has just become available for the public. This new product is practically a small touring car, built for four passengers, but with sufficient room for traveling accoutrement.

In body lines the Tuxedo roadster follows those of the Cole touring car. Its features include a divided center cowl, a rear deck which affords a roomy compartment for baggage, and a special alcove in the back of the front seats which makes possible additional knee room and foot comfort for those riding in the rear seat. The arrangement of the baggage compartment in the rear deck is unique. There is no aperture at the top of the deck, as is customary, but the compartment is accessible by tilting the back of the rear seat forward a few inches. This arrangement furnishes an absolutely air, dust and waterproof compartment—something long sought by automobile tourists the world over. Vanity pockets are also provided on the sides of the car within easy reach of the passengers, which afford a convenient place for veils, goggles and other traveling incidentals.

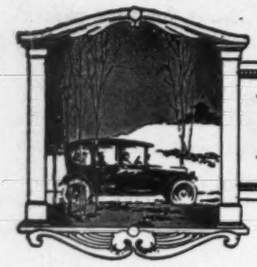
The Tuxedo roadster is equipped with the Cole one-man-top and rain vision, full ventilating wind shield. The body, as stated above, is mounted on the standard Cole Eight chassis, having a wheelbase of 127 inches. It is propelled by the already famous 70-75 horsepower Cole-Northway eight-cylinder motor, which claims the exclusive combination of a counterbalanced crankshaft with light, perfectly balanced reciprocating parts.

K. P. FOOT REST REORGANIZES

New York, June 19—The K. P. Mfg. Co., this city, has been incorporated and takes over all of the interests including the trade name, trade marks, patents, good will, etc., of the former copartnership known to the trade as the K. P. Foot Rest Heater Co. This new company will continue to make the K. P. foot rest heater as well as the K. P. universal rim tool and other specialties soon to be announced. It is incorporated at $25,000, fully paid in. It is the new company's intention to make the K. P. foot rest heater in three sizes and prices; the $25 model for the high-priced cars, another model at $15 and another one for the smaller car trade. The rim tool will be continued at $2 for the present.



An addition to the Cole models is found in the new eight-cylinder, four-passenger Tuxedo



EDITORIAL PERSPECTIVES

The S. A. E.

PROBABLY to most motorists, if they consider the subject at all, the Society of Automobile Engineers appears as a vague body of high-browed calculators whose efforts are devoted to the abstruse technicalities of steel specifications or dimensions of key seats to the hundred-thousandth part of an inch, and whose perspectives do not extend beyond the drafting table or, at the utmost, beyond the assembly department of the factory. While it is true a part of the efforts of the society are devoted to such seemingly incomprehensible matters, these minute analyses and dimensions themselves are of utmost value to the owner in their proper determination, but it is also true that the major portion of the deliberations of the society are centered upon subjects which are of more immediate interest to the general motoring public than at first could be imagined. Their findings are of primal importance of every motorist, just as they are to every manufacturer.

IT is by the determination of the proper sizes of seemingly minor parts and of proper alloys of steel that it has been made possible to produce cars of good quality at low prices. When definite standards of sizes, shapes, and materials are set, then becomes possible the interchangeability of parts. That is, the making of parts in such a way that any one of a number may be taken and fitted without hand labor and without loss of time to any one of a number of different parts with which the first is designed to coordinate. It is this that has made possible rapid production manufacture which means low cost. This comes about through extending the use of automatic machines which reduce the labor cost, which reduce inspection cost, and which reduce the losses due to improperly fitting parts or improper materials.

THE motor car engineer is a little-understood individual. Much has been said about the captains of industry who have risked their money and spent their time for the success of the motor car business, but little is said about the part the engineer has played in providing the basis for the present state of the industry. It is not probable that the present methods of rapid manufacture, which have brought about the low cost of production combined with high quality in cars, could have been realized without the work of the engineers. Their foresight and interest in the future of the business has urged them to sacrifice their time to meet, in working out the solution to the many problems encountered whenever it is attempted to make uniform the varying practices which obtain in different factories.

THE establishment of such practical standards is one of the most valuable activities of the Society of Automobile Engineers. This can be realized, perhaps, when it is remembered that 8 or 10 years ago a motorist had a great deal of difficulty in buying spark plugs which would fit his cylinder, because there were so many different sizes and different threads on the market. The Society of Automobile Engineers, through its standards committee, fixed a standard pitch of thread and standard sizes of plugs, so that spark plugs should fit any American-made car and can be obtained in any hamlet or village of America.

Factory Repairs

FIVE years ago a man spoke with pride when he said, "My car is at the factory being overhauled." He was looked upon as an owner who could afford to have his car properly taken care of. Today it is different. The owner not only finds it unnecessary to go to the expense and lost time of shipping or driving his car to the place of its origin, but knows that he can be thoroughly as well taken care of near his home. Furthermore, there are few motor car manufacturers left who will accept overhauling jobs. The day of the extensive factory repair shop has gone, and this is directly due to the fact that the industry has so aged that a multitude of efficient mechanics has sprung up, which constitutes the backbone of the branch service stations.

IT is another argument in favor of near-to-the-owner service, this creating of reliable sub-repair shops throughout the selling regions. When the burden of guarantee adjustments and car repairs is thrown upon the main factory it is only human nature for many owners to be unreasonable. Correspondence is an unreliable source of information and the factory has a license to be as well protected from unfair transactions as the owner. An example of trickery often confronting a factory which could be avoided through the use of a sub-repair station is found in the following incident experienced by one of the large manufacturers before it had instituted the sub-station plan.

AN owner at a far-away point wrote a heart-breaking letter to the factory picturing the vast amount of trouble he was having with a leaky radiator. The service manager was touched by the import of his troubles and shipped him a new radiator with instructions to the transportation company to release the C. O. D. feature attached, upon delivery by the owner to the transportation company of the supposedly defective part. In other words, the owner got the new radiator free. When the old one arrived at the factory, a glance showed that it had been completely wrecked in a collision. There was no come-back. The service manager could only swallow hard and say "never again."

OWNERS, to a large extent, display reluctance in this rather new method of having their woes which they carefully detail to the factory, referred to a branch house, but it will only be a matter of time before they will wake up to the full value of settling their disagreements personally with the least time lost.

Motorist, Know Thy Starter

Beginning next week, MOTOR AGE will commence the publication of a series of articles dealing with the principles and practical application of electricity as required in a thorough knowledge and mastery of ignition, starting and lighting systems as used on the motor car of today.

Bureau of Mines Points Out Hazards in Gasoline Handling

Advocates the Use of Sand on Garage Floors as Protection

WASHINGTON, D. C., June 16—Motor car dealers, garage men and others who have to deal with gasoline will find much of interest in a report prepared for the Federal Bureau of Mines by George A. Burrell. The subject of the report is "Hazards in Handling Gasoline."

Among other things he says a dangerous practice, common in many garages, is the cleaning of parts with gasoline from an open can. Employes find it easy to clean grease and oil from the motor and other parts with a brush saturated with gasoline and the gasoline is readily ignited by a spark. Such a spark may be caused by striking two pieces of metal together, by the ignition system on the car when the starting crank is turned, and in other ways. In one instance a nut that stuck, was struck with a wrench, causing a spark. The car was instantly enveloped in flame.

The report further says that oily waste should at all times be placed in a safe receptable to avoid the danger of spontaneous combustion. Oily waste will decay, smolder and in time burst into flame. Sawdust when soaked with oil drippings will do the same thing and its use should be forbidden. Sand is a safe material to use as an absorbent of oil. In establishments where gasoline and other inflammable liquids are used, care should be taken to see that the smallest practicable quantities are used and that the liquids are used in an approved manner.

No open light or flame of any kind, nor any machine or belt capable of producing a spark should be allowed in the room where the gasoline is being used. All shafting and machines with belts that are liable to cause a static electric spark should be well grounded. Only incandescent electric lights should be used and these should be provided with guards to prevent their being smashed. All electric switches, fuses, etc., should be outside the room. Danger signs should be posted on all doors opening into the room, warning against the carrying of open lights of any kind inside.

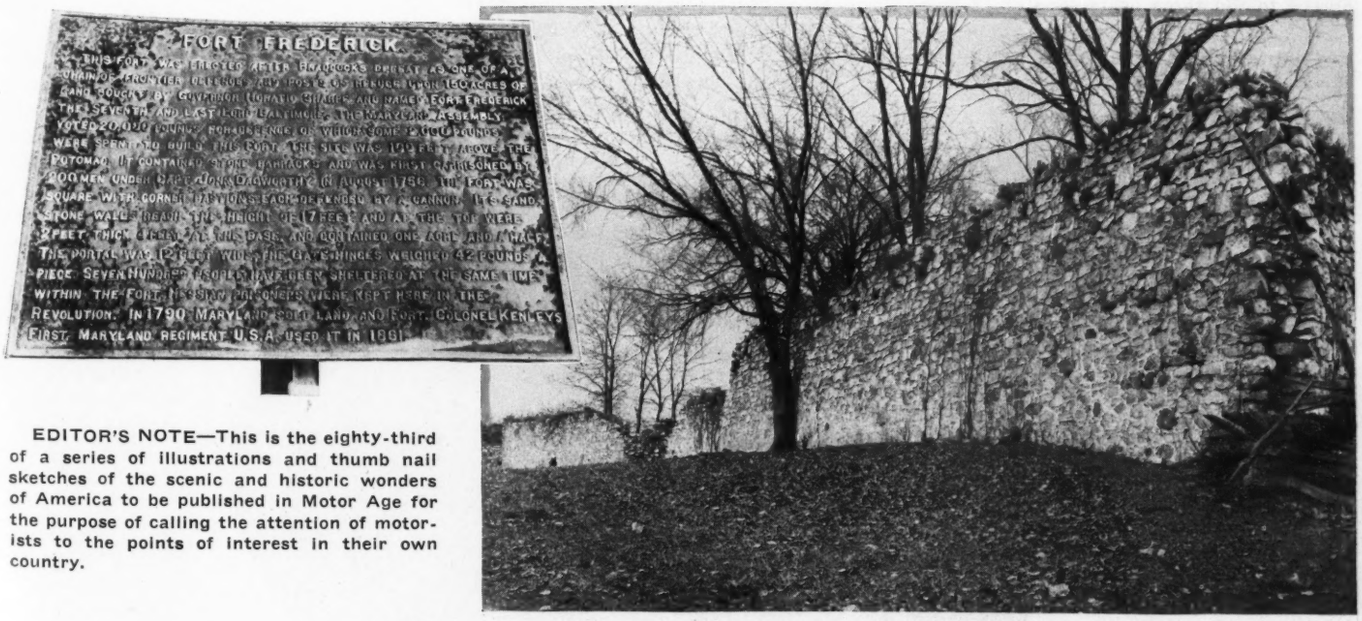
When large quantities of the inflammable liquids mentioned are used the main supply should be stored in a metal tank buried underground and a safe distance from buildings. The working supply should be pumped into the buildings as needed, and the system so arranged that when the pump is stopped all liquid in the pipes will flow back into the supply tank. When the use of an open can is necessary the opening should be as small as possible and a cover should be provided. The cover should be put on whenever the can is not in use. Signs should be posted prohibiting an open flame near the place of storage or near a pump or other handling apparatus. The signs should explain the danger involved.

WILL CURB GAS ADULTERATION

Columbus, O., June 20—The Columbus Automobile Club has taken up the question of adulteration of gasoline by dealers and will prosecute a number of garagemen for alleged fraud. Tests were made of gasoline purchased at several of the local dealers and one was found to contain 50 per cent gasoline and 50 per cent kerosene. Another test showed 40 per cent of the bulk composed of plain water.

An ordinance has been prepared for introduction in the city council making it a misdemeanor punishable by fine and imprisonment for any dealer to adulterate gasoline. The ordinance will compel the dealer to display in figures the specific gravity of the gasoline handled.

See America First — See America Now



EDITOR'S NOTE—This is the eighty-third of a series of illustrations and thumb nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 83—OLD FORT FREDERICK NEAR BIG POOL, MD.

THIS fort was erected after Braddock's defeat as one of a chain of frontier defenses and posts of refuge upon 150 acres of land bought by Governor Horatio Sharp and named Fort Frederick after the seventh and last lord of Baltimore. The site is 100 feet above the Potomac. In its original state it contained stone barracks and was first garrisoned by two hundred men in August, 1756. The fort was square with corner bastions, each defended by a cannon. Its sandstone walls reach the height of 17 feet. Hessian prisoners were kept here in the revolution. Colonel Kenleys, first Maryland regiment U. S. A., used the fort during the civil war in 1861.

Resta Sweeps Card in Dual Meet with de Palma

Peugeot Which Has Carried Away Two Big Victories This Year Remains Invincible

Resta as he appeared before the race *end of the first heat* *end of the second heat* *end of the third heat*

By William K. Gibbs

CHICAGO, June 18—Dario Resta, in his invincible Peugeot, defended his title of speedway champion today by defeating Ralph de Palma in his Mercedes and besides established new American records for 10, 24 and 50 miles. Setting a terrific pace, he captured all three heats, although the margin of lead in his favor was never large.

There was a popular feeling at last Sunday's race that de Palma's Mercedes was equally as fast as Resta's Peugeot and the expression was current that Resta's winning was more the result of luck than of speed or superior speedway generalship. It was to settle this that the speedway hung up a prize of $5,000 for a match race between Resta and de Palma and it was agreed to run three heats—one of 10, one of 24 and one of 50 miles—the winner of two heats to take the entire purse and the loser to get nothing. Besides the $5,000 a trophy also was hung up for the winner.

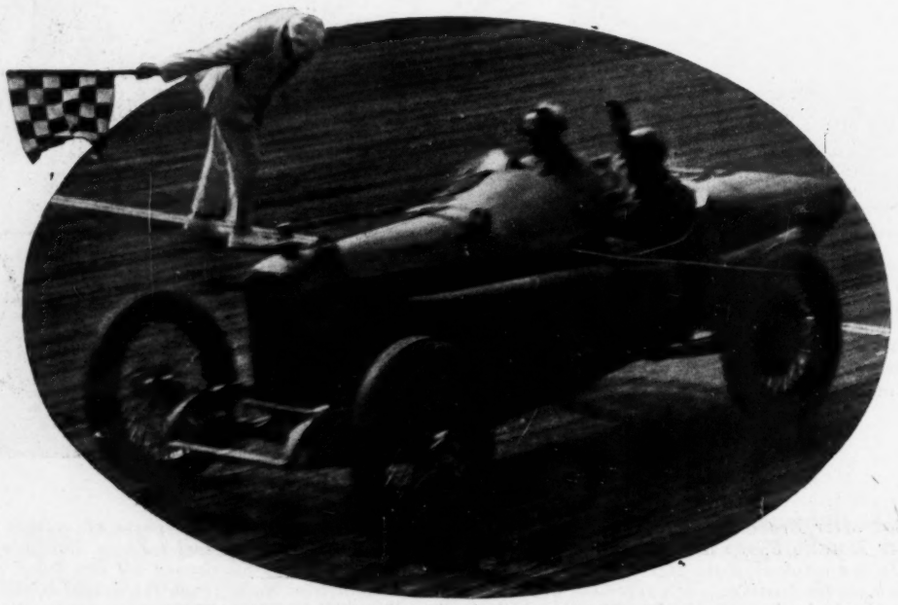
In the first heat of 50 miles de Palma won the pole position in a toss-up, but Resta jumped into the lead on the first lap and held it through the second, maintaining a speed of better than 100 miles per hour, although de Palma was close on his heels all of the time, and in the fifth mile Resta was forced to stop at the pits to tighten a loose spark plug wire and de Palma took the lead. At the end of 28 miles the same spark plug wire on Resta's Peugeot loosened and he stopped at the pits 53.6 seconds while de Palma put on more speed and by the time Resta got away from the pits was nearly two laps in the lead. He held the lead then until the end of the forty-second mile when Resta again took the lead, Ralph's speed having dropped appreciably, each lap after the twenty-eighth mile. As Resta passed Ralph the Mercedes was hitting on two, but the race was too near over to permit of de Palma's stopping and changing plugs, and he kept on, finishing 21 seconds behind Resta.

Resta made two stops and de Palma one, and the trouble for each one came soon after passing the pits so that these laps were turned as low as 55 miles per hour and this cut down the general average materially so that Resta's average speed for the 50 miles was only 96 miles per hour, or 2½ miles per hour slower than his average for the 300 miles a week ago.

The lap by lap summary of the 50-mile heat follows:

Miles	Leader	Lap time	Lap M.P.H.
2	Resta	1:11⅗	101
4	Resta	1:12	100
6	DePalma	1:12	100
8	DePalma	1:12⅕	99¾
10	DePalma	1:13⅖	98¼
12	DePalma	1:10⅘	101½
14	DePalma	1:09⅕	103
16	DePalma	1:09⅘	103
18	DePalma	1:09	104
20	DePalma	1:08⅗	105
22	DePalma	1:09⅗	103
24	DePalma	1:09	104¼
26	DePalma	1:08⅘	104
28	DePalma	1:09⅘	103
30	DePalma	1:16⅖	94¼
32	DePalma	1:22⅘	87
34	DePalma	1:25⅕	84¾
36	DePalma	1:35⅘	75
38	DePalma	2:10	55¼
40	DePalma	1:19	91
42	DePalma	1:10⅗	101
44	Resta	1:09⅖	103¾
46	Resta	1:12⅗	99¾
48	Resta	1:12	100
50	Resta	1:23	87

After a 20-minute intermission the next heat of 24 miles was started, Resta winning the pole on a toss. De Palma had spark plug trouble on the preliminary lap and the heat was held 10 minutes for de Palma to go to the pits. He came around the track to the starting line and the Mercedes seemed to be in good shape for competition. Ralph took the lead in the first lap, setting a pace of 102 miles per hour, but Resta's spurt in the next lap carried him to the front, his pace being 106.5 miles per hour. De



The winner crossing the tape at the end of 50-mile race

De Palma congratulates the champion at the end of the meet

Palma never crossed the starting line in the lead except on the first lap, but was very close and his speed was terrific. In the third lap Resta held to 105 miles per hour, then a 104 for two laps, then a 102 for the sixth lap and from then on he gave the Peugeot an open throttle and built up his speed so that his average for the ninth lap was 107 miles per hour and at this point de Palma and Resta were both even in the back stretch, but on the next lap Resta's average was 109 miles per hour, while his average for the eleventh and twelfth laps combined was 109.75 miles per hour. His total time for 24 miles was 13:42.6 and his average 105.1 miles per hour. De Palma's time was 13:45.8 and his speed 104.5 miles per hour for the 24 miles.

The lap by lap figures of the 24-mile race follow:

Miles	Leader	Lap time	Lap M.P.H.
2	DePalma	1:10⅗	102
4	Resta	1:07⅘	106½
6	Resta	1:07⅖	106
8	Resta	1:09	104
10	Resta	1:10	103
12	Resta	1:11⅕	102
14	Resta	1:10⅖	102½
16	Resta	1:09¾	103
18	Resta	1:07	107
20	Resta	1:06	109
22	Resta	1:06	109
24	Resta	1:06⅗	108

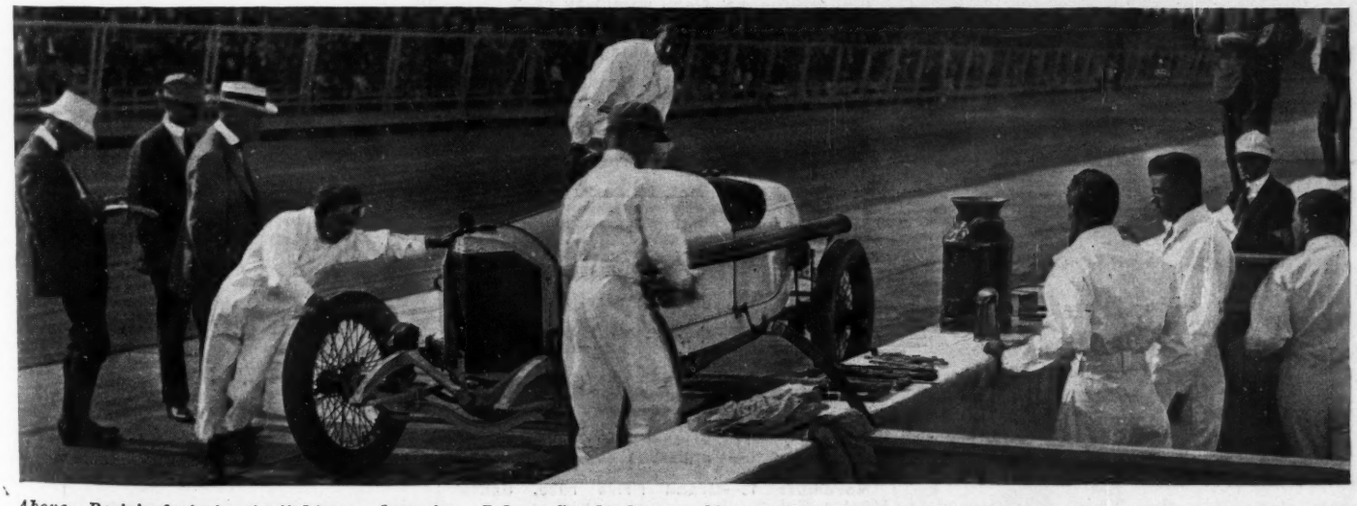
By winning the 2 heats in succession, Resta pulled down the $5,000 purse and cup, but inasmuch as three heats were scheduled, the third was made an exhibition drive and Resta finished less than 3 car lengths ahead of de Palma, the former's time for the 10 miles being 5:51.2, an average of 102.5 miles per hour. Had not the the first lap been rather slow—92.5 miles per hour—the average for 10 miles would have been considerably higher since the speed for the second lap was 102, for the third 103, for the fourth 108, and for the fifth 104 miles per hour. De Palma led for 6 miles of the 10-mile exhibition, but Resta's turn of the track in 106.4 in the fourth lap brought him to the front, in which position he finished.

Immediately after the 50-mile event Resta offered de Palma a set of plugs which Ralph refused rather than have the impression become current that he was aided by Resta in case he, de Palma, should win the next heat.

In taking the 50-mile heat in 31:57.4 Resta broke the 50-mile mark of 88.87 miles per hour set by Christiaens at Indianapolis in 1914. Both drivers averaged 101 miles per hour in the 10-mile event, the best previous record for this distance having been established by George Robertson in a Simplex at Los Angeles in 1910 when he drove 90.99 miles per hour.

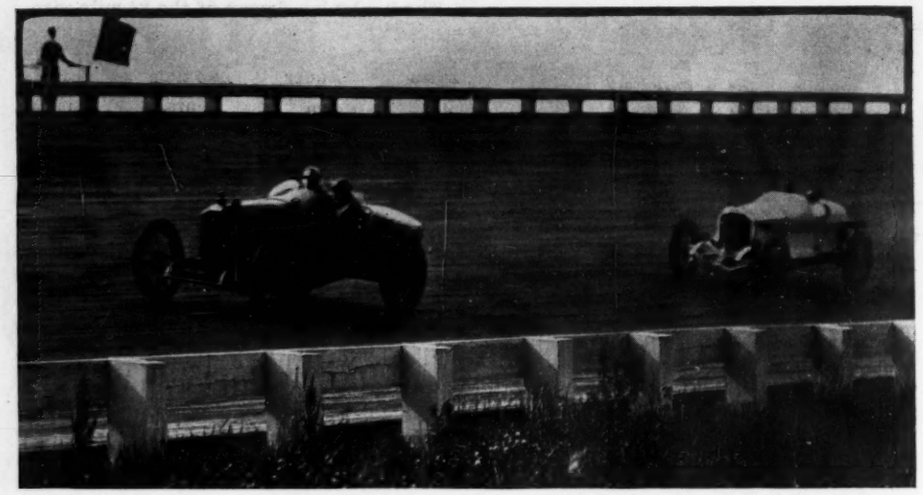
When the race started easily one-half of those who saw the finish were struggling to get into the park and the 50-mile event was over and the 24-mile well under way before all of those who came in motor cars were able to get through the gates.

Such difficulties as these, together with certain short-sighted policies adopted by the Speedway Park Association, are not adding to the popularity of the park as a whole. Prices for seats and parking spaces today were put down to what is usually known as the popular mark, $1 buying admission and a grandstand seat



Above—Resta's first stop to tighten a plug wire. Below—Spark plug trouble caused de Palma's only pit stop and later reduced his motor firing to two cylinders

Where an antique device serves as a friend in need—Resta grinds a valve stem



Resta's lead as shown in this illustration was maintained with but little change in the majority of laps

and $2 a parking space. In the short space of time in which to advertise the race every effort was made to reach the middle class—those who cannot afford to pay $5 or $10 for a seat at the usual speedway race. Bills were posted throughout the Italian and other sections of the city populated by the foreign element, and in each case where a poster was displayed a slip of paper calling for two grandstand seats was given in exchange for the privilege of putting the poster in the window.

All Saturday morning a stream of people, largely Italians, but all evidently a small shopkeeper class, poured into the speedway office under the impression that they were to get two tickets in exchange for their slip of paper. They were disappointed, however, since they were informed that only one ticket would be given and that this was "for 2 days." The feeling aroused against the speedway management was very evident.

TRANSCONTINENTAL HIGH GEAR RUN

San Diego, Cal., June 16—The famous old Pathfinder car, Lena, which blazed the first transcontinental trail, is to start on her tenth transcontinental trip from the San Diego Exposition Saturday, June 17.

Driven by L. M. Maynard, Los Angeles, Lena is to travel over the Lincoln highway, blazing the trail for the Pathfinder Twelve which is to leave the San Diego Exposition grounds July 3 on a run over the Lincoln highway with the car sealed in high gear under the A. A. A.

FRICTION AT TWIN CITY

Minneapolis, Minn., June 19—Having advertised four races for Sunday afternoon, June 11, the Twin City speedway management was notified by Dr. C. E. Dutton, A. A. A. representative, that only a postponed race from Memorial Day was authorized. Harry Fechtinger's Marquette-Buick won the Twin City trophy. Friction resulting from the warning against other races and discontent of the crowd resulted in the management wiring R. R. Kennerdall at New York and asking for another representative to assist in settling matters.

Dr. Dutton had also notified the Speedway company that it must protect the inside safety aprons with cement before sanction would be given for the proposed races July 4. W. C. Barnes, Peoria, Ill., inspected the track and ordered the apron put in and will allow the races July 4. No move was made to replace Dr. Dutton as requested by Mr. Sperry. Ralph Mulford is first entry and Tommy Milton is on the last. Two Delages are reported entered and an entry from Gaston Morris of New York. With $20,000 in cash prizes, four races are open to professionals of the world on the Twin City Speedway July 4. The Mid-Continent races are for 150, 50, 20 and 10 miles.

Racing Events

June 26—Des Moines, Ia., speedway race.
July 4—Minneapolis speedway race.
July 4—Sioux City speedway race.
*July 4—Track meet, Coeur d'Alene, Ida.
*July 4—Track meet, Benton Harbor, Mich.
July 4—Road race, Visalia, Cal.
July 4—Track meet, Elmira, N. Y.
July 15—Omaha, Neb., speedway race.
July 15—Track meet, North Yakima, Wash.
July—100-mile track meet, Burlington, Ia.
August 5—Tacoma, Washington, speedway races.
*August 11-12—Hillclimb, Pike's Peak, Colo.
August 12—Track meet, Portland, Ore.
August 18-19—Elgin road race.
August 26—100-mile track meet, Kalamazoo, Mich.
*September 1-2—24-hour race, Sheepshead Bay.
Sept. 4—Track meet, Newark, N. J.
September 4—Track meet, Elmira, N. Y.
September 4—Indianapolis speedway race.
September 4—Des Moines, Ia., speedway race.
September 4-5—Track meet, Spokane, Wash.
September 16—Speedway race, Providence, R. I.
September 29—Track meet, Trenton, N. J.
September 30—New York, Sheepshead Bay speedway race.
October 7—Philadelphia speedway race.
October 7—Omaha speedway race.
October 14—Chicago speedway race.
October 19—Indianapolis speedway race.
October 21—Track meet, Kalamazoo, Mich.
November 16—Vanderbilt cup race, Santa Monica, Cal.
November 18—Grand Prize race, Santa Monica, Cal.

*Sanctioned by A. A. A.

GALESBURG RACE POSTPONED

Galesburg, Ill., June 20—A drizzling rain and a muddy track made necessary a one-day postponement of the 100-mile race which was to have been staged on the local one-mile dirt track today. Weather permitting, the event will take place tomorrow.

DES MOINES RACE NEXT SATURDAY

Des Moines, Ia., June 19—The Des Moines speedway race meeting will be held Saturday June 24, instead of Monday, June 26, as originally scheduled. Sanction for the change was secured from the American Automobile Association.

All drivers entered in the meet had consented to the change which was made because Saturday is a better day for attracting a big attendance. Elimination trials for the big race of 150 miles for a purse of $10,000 began on Wednesday.

Eddie Rickenbacher, famous driver of the Maxwell team, was one of the first to register in for the local meet. About the first thing he did was to deny rumors that he had accepted a marriage proposal from a Chicago movie acress. He has been accused of such things before.

Drivers who arrived late Monday were DePalma, Christiaens and Galvin and the Duesenberg team, including Eddie O'Donnell and Wilbur D'Alene. Pete Henderson was on the speedway early last week. Ralph dePalma is expected to drive his Mercedes in Des Moines for the first time. He drove a Stutz in the race, which was lost last year to Ralph Mulford by a narrow margin as the result of tire trouble in the last two laps of the 300 miles. Dario Resta has not yet entered but may at the last moment.

The Rubaiyat of a Motor Tourist

With apologies to Omar

By Lucille J. Campbell

Awake! for Dawn is here and gone the Night;
'Tis time to don our Togs and put to Flight
The Crowd that has been gazing at our Car
Since Morning's first faint streaks of rosy light.

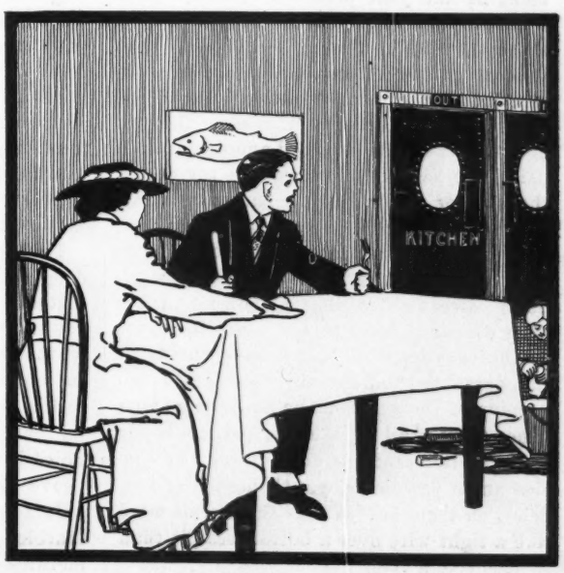
Dreaming, before the Dawn was in the sky,
I seemed to hear a Voice within me cry,
"Arise and fill the Flask—for Yesterday
The Flask was dry."

And, as the Cock crew, we who stood before
The Tavern exit shouted, "Open now the door!
You know what little while we have to waste,
'Tis time and past we hit the road once more."

Lo! We leave this Wayside Inn
Where food was bad, a punishment for sin,
Where Tourist after Tourist with his Car
Abode his little Hour, then went his way again.

With me along some strip of measured miles,
Strown with Tolls, divided well with Stiles,
As shown by Gates along the way—Oh come with me,
And pity those who stay unheeding Nature's guiles.

Here with an Inner Tube beneath the Bough,
A Pair of Pliers, a Monkey Wrench—and Thou
Beside me patching Punctured Tires—
Ah! Punctured Tires were Paradise enow.

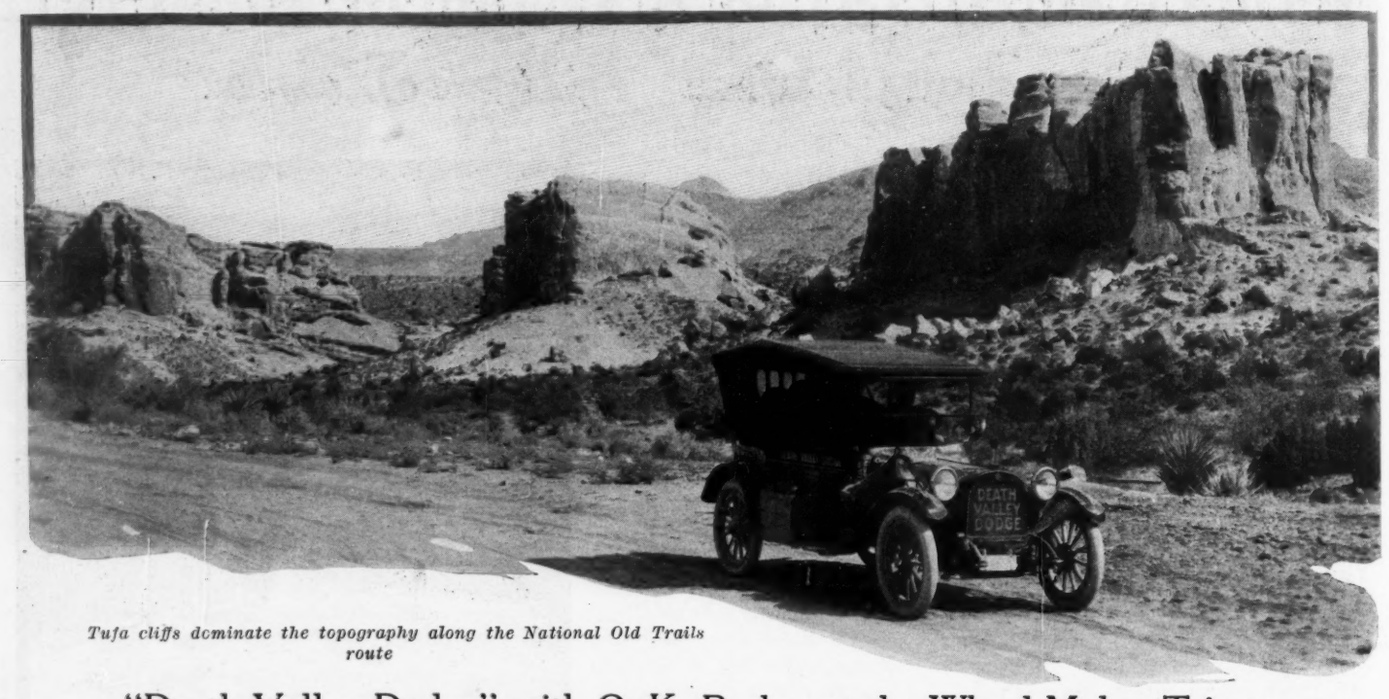


The Destination we set our hearts upon
Draws nearer—or it doesn't—for anon,
The Inner Tubes we patched now hold
A little Hour or two and then go down.

And they who pass us with a merry jest,
They know not—no, not how they're blest,
Until they too descend beneath the Car,
A Jack to aid them on their Quest.

Alas, that Fall should vanish with the Rose!
That days of best beloved sport should close;
Cheer up, the Spring will come again,
And then—Ah, then we'll motor—where?—Who knows?

Conquering the Grand Canyon of the Colorado by Motor



Tufa cliffs dominate the topography along the National Old Trails route

"Death Valley Dodge" with O. K. Parker at the Wheel Makes Trip to Bottom of Arizona's Great Cavern

IF you have ever stood on the beach and watched the waves roll in toward the shore you have seen a wave now and then break farther up on the white sands than its companions. These more venturesome waves might be said to personify the achievements of every line of endeavor—there are always some high spots in invention, science and discovery as the result of ambition that stand out clearly and clean cut and that make the rank and file ponder seriously. Specifically the simile applies to the wonderful achievements of man, with a motor car as his best bower, or vice versa.

Perhaps the most startling accomplishment of the year occurred recently when a motor car crept down the precipitous and torturous path to the bottom of the Grand Canyon of the Colorado, a trail that only sure-footed burros and less sure-footed humans had trod before. For some the rim of this vast two-hundred-and-fifteen-mile paint pot has been far enough; for others the shorter trails leading part way down to the rushing turbulent Colorado has brought a homesickness for the top and level ground that knew no compromise. Some have trusted to their own Shank's mare to carry them to the lowermost part of the canyon, while many have entrusted the nerveless and homely burro with the keeping of their lives as he bore them along a hewn-out trail that has a perpendicular wall for thousands of feet upward on one side and a yawning abyss thousands of feet below on the other—a trail that seems moré like a tight wire over a bottomless pit than it does like a road.

Stunt cars seem to abound in the West and their drivers seem like the man who puts his head in the none too attractive mouth of the lion for the amusement of circus-goers. News despatches a few days ago told of a trip made by O. K. Parker, Los Angeles, Cal., to the bottom of the Grand Canyon in his stunt car, "Death Valley Dodge," which got its name for negotiating this much-feared trackless waste.

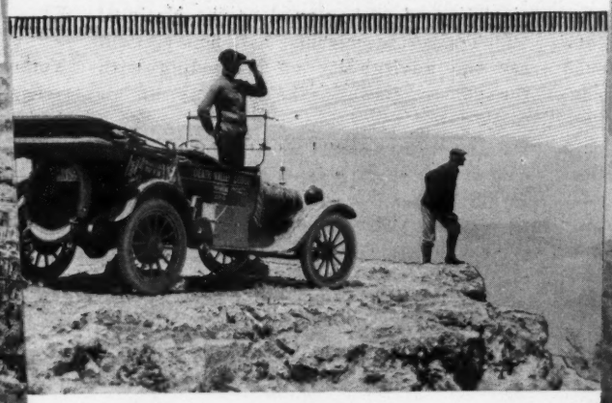
No Mean Task

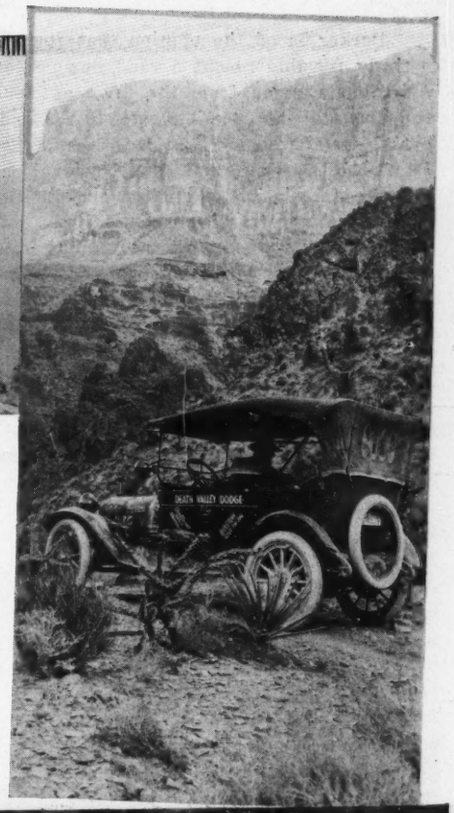
Getting to the bottom of this first wonder of America and then safely out again was no mean task, but it was attempted and accomplished by Parker, who is an engineer, for the purpose of ascertaining the feasibility of constructing a motor road into the depths of Arizona's wonderland, this road to be a detour by which transcontinental tourists, driving over the National Old Trails route, can enjoy the wonderful scenic effects of the most stupendous gorge on the earth's surface and do it without leaving the seats of their motor cars.

Parker drove to the depths of this mile-deep gorge and back to the surface of the plateau, thence out on to Navahoe Point, the highest elevation on the south rim of the Grand Canyon, where it was filmed in motion pictures. The car was driven to the very tip of the point, where no motor car had ever been before. Navahoe Point is a precipitous wall rising 6,000 feet above the bottom of the gorge where the Colorado thunders its way through the Marble and Grand Canyons. The motion pictures of both of these notable achievements will write a new history in the annals of western motoring. These accomplishments are so strenuous that they will undoubtedly stand as records until proper roadways are built, if they ever are, and it is the belief of Engineer Parker that some day these roadways will be constructed.

The trip down into the very bowels of the earth had as a prelude, hundreds of miles of desert travel, in which the car fought its way through the great sand wastes on the route and a dozen mountain ranges with their rough roads and steep grades. These had to be negotiated before it was possible to start the final dash to the high plateaus of northern Arizona and into the depths that form the Grand Canyon.

One can get only a vague conception of what the car and its crew went through in some sections where it seemed as if Nature had combined all the elements to produce obstacles so stupendous that no combination of man or machinery could overcome them, but Nature did not reckon with the vast experience of man in motor car construction, nor did she know that the modern motor car is constructed for such rough work and twisting strains, as the moving pictures of this expedition will show when you see them, as you probably will at your favorite movie theater. However, this is not a case of "They do it in the movies," for this was not a movie stunt, but one of investigation to learn if within a few years we who make transcontinental trips can take in this natural wonder from the seat of our motor car.



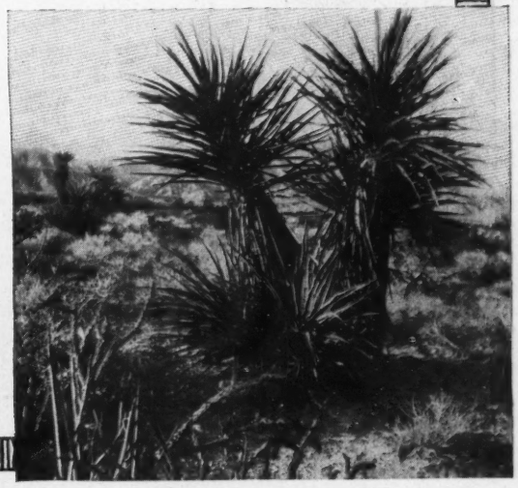


Above—On the top of Navahoe point, 8,000 feet above the sea level and 6,000 feet above the floor of Grand Canyon. Left—Cactus greasewood sagebrush and rocks formed the only road on this pioneering trip. Right—The terraced cliffs of the canyon walls finally reach heights of 5,000 feet, this elevation being made in less than ½ mile of horizontal distance

At the highest point on the south rim of the Grand Canyon. This is Navahoe point, 6,000 feet above the bottom of the gorge

At the bottom of the gorge, where the walls are 3,000 feet high and less than 100 feet apart

Following the trail into the Grand Canyon. The start of the trip into Peach Springs gorge



One of the odd forms of cactus which was encountered many times during the trip

Parker is of the opinion that it is entirely feasible to cut a road down Peach Springs Canyon from the town of Peach Springs, about 50 miles east of Kingman, Ariz., to the bottom of the Grand Canyon, and he predicts that the National Old Trails Association soon will see the advisability of constructing such a road. "It would make the most scenic route in America," he said, "and where it is now an undertaking of tremendous difficulty for the car and considerable danger to the crew, this side trip to the bottom of the canyon can be made wonderfully attractive to motorists. I shall report the practicability of such a road to the National Old Trails' Association, and hope it will see the advisability of proceeding with the construction of the roadway at an early date."

Since its successful penetration and circuit of the alkali wastes of southern California Parker's car has come to be known as "Death Valley Dodge," and now that it has added new laurels to its crown it may be like the much-married members of the feminine population and add the hyphen and "Grand Canyon Conqueror," T. R.'s comments on hyphenated Americans, notwithstanding.

Under the shadow of Sunset Peak at junction of Heels canyon and Peach Springs gorge on the way to the bottom of the canyon

Route Inquiries Answered

Youngstown, O.-Detroit, Mich.

Youngstown, O. — Editor Motor Age — Kindly publish the best route from Youngstown, O., to Detroit, Mich.—Chas. L. Beecker.

On your trip to Detroit, Mich., you will find your best route is to go up to Cleveland and take the boat, but if you wish to make the trip by machine all the way around you will encounter several stretches of bad roads. The best way to go is as follows:

Go up to Warren, Ravenna, Kent, Akron, Medina, Grange, Pittsfield, Wakeman, Norwalk, Bellevue, Fremont, Woodville, Toledo, Ida, Monroe, Newport, Trenton, into Detroit.

Volume 4 of the Automobile Blue Book will give you a complete routing for this trip.

Edwardsville, Ill.-New York City

Edwardsville, Ill.—Editor Motor Age—Kindly give me the best road from Edwardsville to New York City—Thos. Williamson.

In going to New York City you will find the best routing, taking everything into consideration, by going up through Staunton, Litchfield, Hillsboro, Nokomis, Pana, Shelbyville, Mattoon, Charleston, Paris, Clinton, Rockville, Bainbridge, Danville, Indianapolis, Greenfield, Knightstown, Cambridge City, Richmond, Lewisburg, Englewood, Vandalia, Springfield, Columbus, Newark, Zanesville, Cambridge, Washington, Morristown, Wheeling, Washington, Uniontown, Cumberland, Hagerstown, Frederick, Baltimore, Elkton, Wilmington, Chester, Philadelphia, Trenton, Princeton, New Brunswick, Perth Amboy, to New York City.

Volumes 4 and 3 of the Automobile Blue Book will give you complete routing for this trip.

Detroit, Mich.-Grand Rapids, Mich.

Detroit, Mich.—Editor Motor Age—Kindly give the best route from Detroit, Mich., to Grand Rapids, Mich.—W. Herber.

The best route from Detroit, Mich, to Grand Rapids is to go out Grand River Ave. to Farmington, then through Novi, New Hudson, Howell, Fleming, Fowlerville, Weverville, Williamstown, Okemos, Lansing, then go out Saginaw street in Lansing to Grand Ledge, Mulliken, Lake Odessa, Clarksville, McCords and Cascade into Grand Rapids.

Volume 4 of the Automobile Blue Book will give you the complete routing for this trip.

Chicago-Morrisville, N.Y.

Aurora, Ill.—Editor Motor Age—Kindly give the best routing between Chicago and Morrisville, N. Y., selecting the roads that are now in the best condition.—D. J. Peffers.

In going to Morrisville, N. Y., your best routing is to go through Plainfield to Joliet, then continue east over the Lincoln Highway through Frankfort, Dyer, Valparaiso, LaPorte, New Carlisle, South Bend, Elkhart, Goshen, and Ligonier. Here you leave the Lincoln Highway and go through Kendallville, Butler, Edgerton, Bryan, Stryker, Archbold, Wauseon, Delta, into Toledo, then out through Woodville, Fremont, Clyde, Bellevue, Norwalk, Oberlin, Elyria, Dover, Cleveland, Willoughby, Painesville, Ashtabula, Conneaut, Erie, Westfield, Fredonia, Silver Creek, Evans, Buffalo, Williamsville, Pembroke, Batavia, Caledonia, Avon, W. Bloomfield, E. Bloomfield, Canandaigua, Geneva, Waterloo, Seneca Falls, Auburn, Syracuse, Fayetteville, Cazenovia, and Nelson, to Morrisville.

Volumes 4 and 1 of the Automobile Blue Book will give you complete routing for this trip.

Father of the Jackson Highway

ONE of the considerations that lifts the Jackson highway project from the ephemeral level of a day-dream to an abiding stratum whereon is promise of practical achievement is Peter Lee Atherton.

Because Peter Lee Atherton puts his name down as president of the Jackson Highway Association, hundreds of zealous good roads builders in the North and South are given fair assurance that the Jackson highway, running from the Great Lakes to the Gulf, through Indiana, Kentucky, Tennessee, Alabama and Mississippi, will grow to be the Great North and South artery of traffic, of which the Daughters of 1812 had visions as far back as 1910. It is not that Mr. Atherton is a popular idol in the South or even in Kentucky, his home state, but those who know him—and he has figured in every large road meeting in the South during the last 2 years—look upon him as the sort of a creature who manages to "git whar he is a-goin'."

Peter Lee Atherton is an intensely practical man. Down in Louisville, where the city directory harbors his name, Mr. Atherton is regarded as a citizen who is working in his shirt sleeves, so to speak, from dawn until moonup. Once he throws his energy in favor of a project, that project, no matter how difficult of consummation, begins to acquire something like a reasonable proportion of its chances to be a success. And Mr. Atherton is at work on something or other of public import all of the time. He would not be content without some troublous public movement calling for his interest and energy, and he has the faculty of fitting himself to the job to which he is assigned, however strange it may be. Mr. Atherton has the pleasant advantage of wealth, and the accompanying privilege of applying it to the thing he undertakes to accomplish, if he chooses. His wealth, however, though considerable, does not debar him from active work of an intense kind, and does not purchase for him freedom from a public responsibility which he believes every man holds according to his position and resources.

Making a Phantom Real

Because of this feeling and the further knowledge that men of wealth and influence were required to bring success to such a movement, Mr. Atherton recently took the leading part in a movement to raise $300,000 for an auditorium in Louisville. The auditorium project had been an ugly phantom to the public men of Louisville for many years, for the reason that several efforts to realize it had failed, and that the chances of a further effort being successful appeared to be remote.

Mr. Atherton's first interest in good roads was contemporaneous with the advent of the motor car. He was one of the first to foresee that the country's highways were inadequate to meet the rapid development of the motor car, and was also

Peter Lee Atherton

one of the first in Kentucky to apply energy to projects designed to overcome this inadequacy. His first step was to plan and build a system of roads through his own 200-acre farm in Jefferson county, his acquired knowledge of engineering enabling him to do the work himself. His growing interest in better highways led him, in 1911, to organize the Lincoln Central Road Association, of which he became president, for the improvement and maintenance of a road between Louisville and Lincoln Farm, in La Rue county. In four years $75,000 was expended in putting this road in condition and making it attractive to tourists wishing to visit Lincoln's birthplace. In 1912, in order to obtain needed good roads legislation, Mr. Atherton saw that the practical method was to enter the legislature. This he did, through the grace of the people's vote in Jefferson county. His fight for better roads laws did not begin nor end, however, with his term in the state legislative body, but covers a period of 15 years, during which time he has done much good.

Mr. Atherton has the faculty of getting the people along the highways intensely interested in general good roads movements. He originated the idea of general work on roads in 1911, when he had a week set aside for the people along the Lincoln Central road, now a part of the Jackson highway, to help in resurfacing the road. Through his efforts, the Nashville meeting last September for the organization of the Jackson highway was brought about. The Jackson highway is now in good condition over nine-tenths of its mileage in Kentucky and Indiana; three-fourths in Tennessee and one-half in Alabama and Mississippi. It is already serviceable to motor tourists over its entire route from Chicago to New Orleans, though active work on many parts of the road during the coming summer will hamper comfortable travel. Mr. Atherton is authority for the statement that it will be ready for comfortable travel, either from Chicago or Buffalo, its eastern terminal, by December; and Mr. Atherton's record for practical achievement will make it so.

In a speech at Nashville last September Mr. Atherton said: "It seems most appropriate that a highway should be named for Andrew Jackson because, while he was a great soldier and a great statesman, he was even a greater Democrat; not a Democrat in the narrow partisan sense of the word, but in his love of true democracy, his love of the people. An American highway is the most democratic institution of the most democratic country in the world. It offers itself with equal freedom of service to the barefooted child of the laborer and to the silent, swift-moving wheels of the high-powered car of the man of wealth. On the highway all men meet as equals and all should show equal courtesy and respect.

"Of all the people for whom Andrew Jackson lived and labored, his greatest interest and his keenest sympathy were for the people who live in the country. And the whole epic of country life is written and enacted along the roadway. Over the highway travel those who minister to the little soul that is just entering the lists of life. Over the highway goes the boy to his school, to his neighborhood pastimes, to visit his sweetheart, and to worship in the village church. Over the highway the man leads his bride to the altar, and over the highway she goes with him to establish the finest institution in the social life of the whole world, the country home, simple or proud, of a free-born, American citizen. Over the highway he takes to the mart the fruits of his labor, and when to him is given the end of labor, over the highway those who have known him and loved him in life follow him with bowed heads to his last resting place.

Spirit of Andrew Jackson

"Surely, and most surely, could we imagine the spirit of Andrew Jackson hovering over this meeting, we might hear from that spirit this invocation: 'Rather than any cold and stately shaft of marble or of bronze built in my name and to my memory, a broad highway that runs the length of the land I strove to make strong and enduring; a highway that offers its generous service to all mankind; a highway that brings closer together and makes known to each other people who live in different climes and under different conditions; a highway that will stand a splendid, useful monument so long as this nation shall endure.'"

Scope of Activities of S. A. E. Broadened in Summer Cruise

Men Who Design the Cars in Conclave on Georgian Bay
Steps Taken for Cooperation with Army and Navy

DETROIT, Mich., June 16—The 540 engineers and their friends who cruised Lake Huron and Georgian bay on the steamer Noronic have succeeded in combining business and pleasure in a most profitable manner from the standpoint of work accomplished. With silken flags waving, paper streamers blowing in the breeze and the Packard band playing, the steamer left Detroit June 12 on the cruise to Mackinac and through the Georgian bay and returned today to Detroit.

Formation of an authorized glossary of the terms used in distinguishing motor car parts was probably one of the most important accomplishments of the Society of Automobile Engineers. This was embodied in the acceptance of the Nomenclature division report of the Standards committee of the S. A. E. during its annual midsummer meeting which took the form of a cruise of 5 days on the Great Lakes.

Within an hour after the departure the engineers had settled down to the first official work and every morning and afternoon, except Wednesday, was devoted to professional sessions. Most of the divisions of the Standards committee made their report and nearly all of them were accepted by the society after debate and explanation. A number of new standards in throttle lever arrangements, as reported by the Carbureter Fittings division, were accepted. The Electrical Equipment division devoted itself chiefly to lighting and a standard headlight bracket in three sizes was adopted. Dimming devices were not recommended for the purposes of eliminating glare. By that it was taken to refer to dimming devices that operate by reducing the current supply of the lamp.

New Standards Adopted

A great deal of work was reported on standard speedometer drive connections, but it was found that the state of design at the present time prevented the standardization at this date. The Electric Vehicle division recommended standard dimensions for charging plugs which were accepted. Standard taper sockets for fender irons, standard dimensions for piston ring grooves, and an increase of ¼ inch in the length of the thread of the standard S. A. E. bolts were accepted, as was complete list of sizes and dimensions for flexible conduits for incasing electric wires.

To motorists in general the new nomenclature accepted by the society will be most important, not that the names themselves are out of the ordinary, but that it is a certainty practically every manufacturer of cars and parts in America will be using the same name for the same part, and the old-time confusion will be a thing of the past before another year has gone. Already the names chosen are appearing in the manufacturers' parts lists.

A new division which promises to be very active and to have a very distinct bearing on the engineering of the future is the one just appointed for aeronautic standardization. Henry Souther, former chairman of the Standards committee, outlined the great need for standardization in military machines. Howard Coffin also spoke on the same subject, saying there were 30,000 men being trained by the allied armies and that the allowance is four aeroplanes per man at the front. He added that the number destroyed daily in the war was greater than the total number in America. It is expected that the other divisions of the Standards committee will be kept busy by the consulting demands of the new division.

President Russel Huff of the Packard company in his opening address stated that although the membership of the society was now nearly 3,000, it could be at least 5,000. He also discussed the matter of affiliating with other allied societies with the S. A. E., which is mentioned more in detail below. Mr. Huff said the aeroplane, the passenger car, the truck and the tractor, even the motor boat, all had much in common and that a natural bond bound together engineers in all these professions. There were about 900 different firms represented by the membership of the society, and lists which had been compiled showed 5,000 firms which could fittingly have such representation. At present the number of men per firm shown on the membership list was 2.2, though some firms had as many as ten representatives. Even figuring on only one per firm, the society's roll ought to contain 5,000 names.

Mr. Huff mentioned the fact that the war department had twice called upon the society for conference work in connection with the army truck specifications, and that much good had resulted. He also drew attention to the fact that there were two past presidents of the S. A. E. on the naval consulting board, A. L. Riker and Howard Coffin, the latter also being chairman of the industrial preparedness committee, while a third past president, Henry Souther, was consulting engineer to the aviation corps by government appointment.

Nomination of Officers

George W. Dunham, consulting engineer, was nominated for president of the society for the coming year with J. G. Vincent, Packard Motor Car Co., as vice-president, and B. B. Bachman, Autocar Co., and F. E. Moskovics, Nordyke & Marmon Co., as councilors. Herbert Chase remains treasurer. The nominating committee held at the business meeting consists of K. W. Zimmerschied, Detroit section; F. E. Place, Mid-West section; G. P. Dorris, Indiana section; E. S. Foljambe, Pennsylvania section, and David Fergusson, member at large.

A movement being on foot to ally the activities of the society with the marine, tractor, stationary and aeronautical fields may mean the addition of four vice-presidents to the governing staff of the organization and two additional members of the council. The societies which represent the activities of these four kindred industries have made a move toward consolidation with the S. A. E. and this gives prominence to the thought that in a very short time the membership of the society will be greatly increased and its power and influence also greatly expanded.

Associations May Combine

Howard Coffin spoke upon the widening activities of the society. He said that the organization was originally intended to go beyond its present scope. In fact if the definition of the word "automobile" is looked into closely it will be seen that it covers any mechanism which is self propelling. It is necessary that cognizance be taken in the labors in other fields. High-speed motor boats, air craft, both heavier and lighter than air, and the S. A. E. should make itself responsible for this development. The time has come, he explained, for the society to make itself active in all lines that are really covered by the term "automobile" in its broadest sense.

A motion has been made to alter the constitution of the society so as to include a new grade of membership known as the United Service engineer. The qualifications necessary are the same as those for full membership in the society but the initiation is reduced without the privilege of voting. This is done in order to allow engineers in the United States army and navy whose work brings them into close touch with transportation problems to enjoy the benefits of S. A. E. membership at a price which will coincide with the relatively low incomes of army and navy engineers.

Never has a more interesting talk been given the society than that by C. F. Kettering, Delco engineer, in opening the professional session. Mr. Kettering offered the rare and happy combination of a fascinating subject and a clever lecturer, and consequently kept the 300 attending members spellbound as he led them through some of the wonderful developments in

materials recently obtained through the medium of pure science.

He spoke of how our close attention to the work of production has allowed us to forget to a large extent the work of the experimental scientists who are forever searching through the medium of pure science for new materials and new methods. As a concrete example he mentioned alloy steels and rubber. Our cars would be ponderous affairs if it were not for the alloy steels which compose the principal parts. It would be impossible to make them anywhere near as economically if it were not for the alloy steels that are necessary in the tools that turn out the metal parts.

Vulcanization was discovered in the laboratory and from this seemingly unimportant discovery the entire art of rubber working with all its importance to the human race came into being. Another simple discovery, if regarded superficially, was that of mixing tungsten with other metals. This discovery has revolutionized the manufacture of motor cars, as it is the basis of high-speed steel, without which present manufacturing would be impossible.

Bakelite was the next example of a new material. Mr. Kettering spoke of how it had been discovered in the laboratory, that two chemicals—carbolic acid and formaldehyde—if heated under pressure, reacted together to form a new material which had entered into a marvelous number of industries. When mixed with wood pulp and molded it is used for a great variety of purposes and can be molded to take any desired form. He told of how Mr. Hyatt started in search of a billiard ball which would be more resilient than ivory and as a possible result founded the Hyatt bearing company, the celluloid industry and finally kept on even after these two great by-products had been achieved until in conjunction with Dr. Bakel and Charles Burroughs he made the Bakelite ball which has a much greater elasticity than that of ivory.

Mysteries of Heat

The speaker then led his hearers into the mysteries of heat. The effects of heat are shown in the movements of the molecules of which a body is composed and hence the effect of a warm body upon a colder or vice versa is due to the collision of molecules moving at different relative velocities. Hot objects have rapidly moving molecules, cold ones have slower moving molecules. The effect of cooling a body is to slow up the molecules. Mr. Kettering demonstrated the condition of molecular cohesion in cold bodies by immersing several objects in liquid air. A rubber ball, a flower and a metal container were all shown to have their structural strength destroyed by the slowing of the molecules.

Mr. Kettering then came to the subject of the earth's supply of energy. The sun is the only source of energy, and until we can couple with it directly, we will not be perfect.

The enormous sources of water power which we have at our disposal were touched upon. He compared the 600,000,000 horsepower available at present from water power to the 62,000,000 horsepower generated by existing motor car engines, and stated that the ratio of supply to demand is greatly in our favor. We have available 25,000,000 horsepower of animal energy. It takes 125,000,000 acres of land to feed these animals. Mr. Kettering said it would be a poor chemist that could not produce more horsepower than that from this huge area of ground. The speaker dwelt on the impractical suggestions of adding a few drops of material to water in order to produce energy by separating the hydrogen from the oxygen, as the amount of energy necessary in doing this is equivalent to that secured by combustion. If it were possible to change the air and have a greater percentage of oxygen we would be able to use fuels that are not now possible.

Radium and Its Possibilities

Radium throws off particles of itself at an incredible velocity and it is the kinetic energy of these particles which causes the warming up of the surrounding container. The strength of a piece of steel is many thousands of pounds per square inch. If we could find means to let loose the energy which binds together the molecules of the steel we should have an inexhaustible source of power. As an example of this, the molecular forces holding together a grain of corn would provide over 2,000 horsepower for 24 hours if we could find means for letting these hidden molecular forces loose.

Interesting Papers Are Presented

Professional Sessions Profitable

CAR PERFORMANCE

By D. L. Gallup

MR. GALLUP points out the diversity of opinion on what constitutes desirable car performance in the minds of engineers and of the public generally. He believes this is largely due to the great diversity of claims which have been made in advertising literature and decries the sort of tests which have been made the basis of this publicity, pointing out that a majority of them are conducted under such conditions as make it practically impossible for the car owner ever to duplicate or confirm them.

The kind of an expression or test which will inform the buying public most is one which will tell what the car will do in the hands of the average owner, and define the conditions under which a demonstration of this ability can be made, such conditions to be relatively simple and easy of fulfillment.

Only very broad tentative suggestions are made but it is hoped that concrete suggestions will be formulated as a result of the discussion.

Probably a time will never come when manufacturers will agree that reasonableness in advertising practised consistently is of more genuine value than extraordinary claims of "stunts." On the other hand, there is no question but that in the near future an official request will be made for some form of test for "car performance" that will take into account all of the variables affecting such performance, and that can be conveniently used.

This paper then serves a double purpose: One is that of a warning and the other that of a basis for discussion as to what items properly belong in such a formula as may be suggested and eventually adopted.

Why is the S. A. E. through one of the Divisions of the Standards Committee, now endeavoring to establish a form of test for gasoline consumption and also one for acceleration ability?

Simply to obviate "freak" tests with their attendant misinformation, and also to furnish the conservative engineer with information of value to him in rating his product. Even more necessary is a formula for "car performance"; one that will enable the engineer or even the prospective purchaser to "rate" a given car and thereby establish a means of comparison; one dealing particularly with the overall efficiency, or, better yet, with the dollars and cents for upkeep.

John Younger, chief engineer of the truck department, Pierce-Arrow Co., submitted a written discussion on Professor Gallup's paper. This was read by K. W. Zimmerschied after he had read Professor Gallup's paper. Professor Gallup pointed out in his paper the fallacy of giving tests made under special condition as representative of stock car performance. He also dwelt on the advantage which would accrue from having a standard rating formula which would enable buyers to compare performance and price in making a choice.

Mr. Younger's communication dwelt on the desirability of a formula which would take into consideration something besides the mechanical measurements of the car. He particularly favored the sigma formula. It reads

$$\Sigma = \frac{0.0039\ d^2 \times S \times N \times G \times M}{D}$$

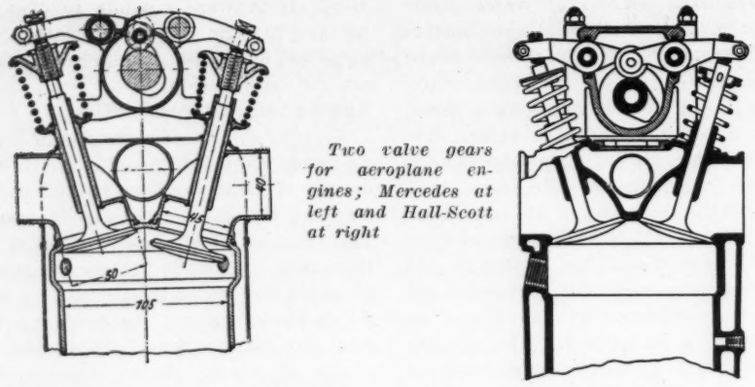
Where d equals bore, S equals stroke, N equals number of cylinders, G is rear ratio, M is gasoline consumption in miles per gallon, and D is the diameter of the wheels.

KEROSENE VERSUS GASOLINE

By Charles E. Lucke

THE author outlines the factors leading up to the present high cost of automobile fuel, states that the introduction of new distillation processes will not solve the problem, but that the development of kerosene-utilizing appliances will produce results satisfactory to everybody.

The paper proceeds to show why kerosene cannot be used on the present gasoline cars. The adaptation of the gasoline automobile engine to the use of heavier fuels than will vaporize without the use of heat is entirely a problem of heating and heaters.



Two valve gears for aeroplane engines; Mercedes at left and Hall-Scott at right

The author reviews at length the principles embodied and the construction of the heated vaporizers or vaporizing heaters now used in stationary and traction kerosene engines and in alcohol engines, giving illustrations of a number of such devices.

After thus developing what in his opinion are desirable and good principles, the author describes a form of vaporizer embodying such principles, which he states has had successful trials (both block and road) in automobile service. A semi-automatic starting burner to accompany the vaporizer is also described, both as regards its construction and operation. In conclusion the hope is expressed that the principles outlined will result in the production and use of kerosene automobiles on a scale sufficiently large to affect the price of fuel within the next year.

Automobile designers, manufacturers and users have become accustomed to the idea that gasoline is the one proper and necessary fuel, and have consistently demanded it, rejecting everything else, except perhaps those few substitutes that have properties so similar as to require no change in the construction of the mechanism or in its use. This view, imposed on the oil refiner in the form of ever more rapidly increasing demands for gasoline production, has resulted in some reactionary consequences, natural enough in view of the market conditions that limit him in the purchase of crude, with the sale of all of its refinery products in addition to gasoline on the one hand, and the chemical limitations on the yield of these products on the other.

It is natural that the refiner, meeting the demand for greatly increased quantities of gasoline yearly, and finding himself saddled with a much larger corresponding yield of heavy distillate of the kerosene and gas oil class without any similar demand, should be compelled to readjust his prices as a first step in saving himself from an unsalable congestion of heavy products, and from financial loss. It is also natural that the refiner should seek crudes that have high natural gasoline yields, but it necessarily follows that these crudes themselves should, as a consequence, rise in price, and so more or less neutralize the advantage of their use.

Development of satisfactory means of utilizing kerosene by automobile engineers will entirely change the situation from every standpoint, and produce results entirely satisfactory to everybody, which is impossible by any other procedure. The new cracking processes do not constitute a satisfactory solution for three principle reasons: (a) Kerosene cannot be removed from the market because it is an old commodity and the most perfectly distributed oil product in the world's markets; (b) the cost of installing new plants involves millions of dollars, which must be paid for by the new product, assuming the refiner can command the capital in the first place; (c) all of the new cracking processes are patented and patent rights certainly will not be made available to everybody, so that some refineries must continue as they are or be forced out of business by large interests commanding both capital and patent rights for the new processes and therefore in a position to keep up the prices of the products of these patent-protected processes.

P. S. Tice gave a very illuminating discussion on the paper and went into the matter in such detail that he was requested by the chairman to submit his discussion in writing and accompany it by sketches. The gist of his talk covered the effect of adding heat to the incoming mixture and he went in considerable detail, into the variations caused by open and closed throttle. Mr. Tice stated that it had been his experience with the heavy fuels that it is impossible to idle continuously on pipe exhaust heat. The engine will run well for a short time but will then stop.

Mr. Tice is not in agreement with Dr. Lucke in exhaust jacketing the inlet in that he believes it is bad practice to preheat the entire mixture. Experiments show that in exhaust jacketing work the temperatures of the mixture will run nearly 400 degrees and the resulting economy is bad. The remedy he suggests is to evaporate the fuel first and then mix it with air and Mr. Tice has developed a method whereby the air is admitted in the upper part of the intake where there is located a dome or chamber against which the particles of fuel strike and obtain a temperature of about 170 degrees.

RECENT AEROPLANE-ENGINE DEVELOPMENTS

By Neil MacCoull

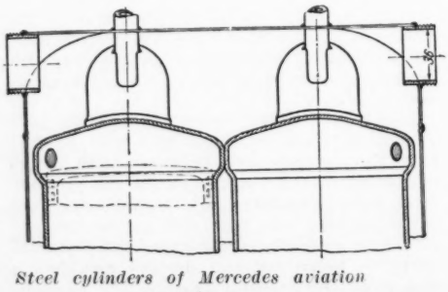
THE author gives a brief review of developments during the past year in the construction of aeroplanes, particularly as affected by the European war. He takes as an example the Renault twelve-cylinder engine, citing the respects in which the present differs from previous models. Such factors as the changes in cooling systems, method of drive, valve construction and starting devices are considered.

The requirements of aeroplane engines, such as constant service, high speeds (of aeroplanes) and streamline form of engines and radiators, are outlined. Propeller requirements are dealt with at length, curves being given by which the efficiency and diameter of the propeller can be obtained. In conclusion a number of different engine installations are illustrated and compared.

The Great War is giving aviation a literal trial by fire which is proving it to be even more dependable and indispensable than the wildest dreamers had predicted; and as the fit are continually being separated from the unfit, progress is being steadily recorded. The progress during the year since the writer presented his paper on Aeroplane Engines before this Society, has not been marked by the creation of radical designs, but by the detail refinement of engines involving the fundamentals of conventional automobile practice. This is because most aeroplanes are now expected to make long flights over water and hostile ground where engine failure often results in the death of the aviator as well as the loss of valuable military information, and reliability is of far greater importance than in times of peace, when an aviator can almost invariably glide to earth in safety with a dead engine.

Most military aeroplanes are expected to make flights of several hours' duration over enemy land. Maximum speeds of less than 80 to 90 miles per hour are almost sure to mean that an aeroplane will be brought down by enemy aviators in short order. Speeds of 90 to 100 miles per hour are now becoming more frequent. The speeds will continue to increase as far as possible because of the great advantage possessed by a high-speed machine over its lower-speed adversary. The only reason these speeds are not exceeded is that the practicable limit with the present construction is nearly reached.

There is another type of aeroplane about which not much is heard because it is not built outside the countries engaged in war. Its sole duty is to protect large cities and other vulnerable points from enemy aircraft. It must be able to climb rapidly and possess high speed. Reliability is not so essential as for the raiders because it is always possible to land on home territory in case of engine trouble; fuel economy is not so important because it does not often remain in the air more than an hour. For such aeroplanes the revolving air-cooled engines of the Gnome and La Rhône types reign supreme because of their light weight. It is no secret that all altitude and speed records are held by engines of this type.

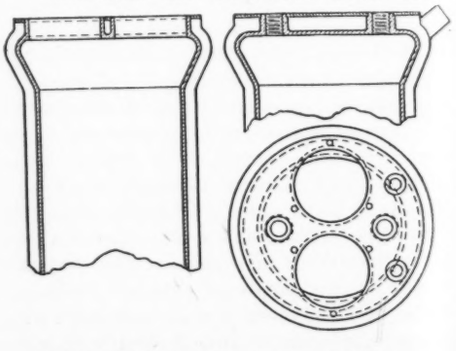


Steel cylinders of Mercedes aviation engine

DIFFERENTIAL SUBSTITUTES

By D. D. Ormsby

SUBSTITUTES for conventional type of differential are considered under four



Steel cylinders of V-2 Curtiss aviation engine

classifications; namely, the free-wheel type, the crank and eccentric types, the spiral gear type, and the solid axle. Examples of each of these classifications are described and the advantages and disadvantages of some of the more practical ones discussed.

In connection with the free-wheel types, the author explains that while these eliminate the inherent defect of the standard differential by differentiating when the wheels have unequal traction, yet with unequal size of tires the free-wheel type will drive more on a large tire because the wheel with smaller tire will have to rotate faster to make up for the distance traveled by the wheel having the larger tire. It is explained further that in making a turn all the power is applied to the inner wheel.

Mr. Ormsby believes that the spiral gear type will be the ultimate solution of the present differential problem.

Considerable space is devoted to a discussion of the elimination of any form of differential whatever. Although such construction has advantages of eliminating the spinning of the wheels and assuring positive travel under all conditions, Mr. Ormsby believes the disadvantages too great to be overcome. There must always occur, when the car is making a turn, a slippage of either the inner or outer wheel, or both, and from experiments conducted with a standard type of touring car and a well-known runabout, the author of the paper has come to the conclusion that the difference in travel of inner and outer wheels in making a turn at a given angle, depends on the gage and not upon the radius of the turn. Therefore, no matter how great the radius, the amount of slippage through a given angle is always the same; consequently, no matter how slight the diversion from a straight line, an extra load is always thrown upon the rear wheels, tires and axles where the solid axle construction is used. Another objectionable feature of the solid construction is the extra amount of power consumed in making short turns, on account of the necessity of slipping one or both wheels. Another condition which the solid axle does not take care of, is unequal size of tires. In a motor truck one tire is usually worn more than the other. To make up for the greater distance traveled by the larger wheel, the smaller wheel must slide the difference, or the larger must slip part of the time to compensate for the less distance traveled by the smaller one. This would occasion excessive wear on the new tire until both were brought to a uniform size.

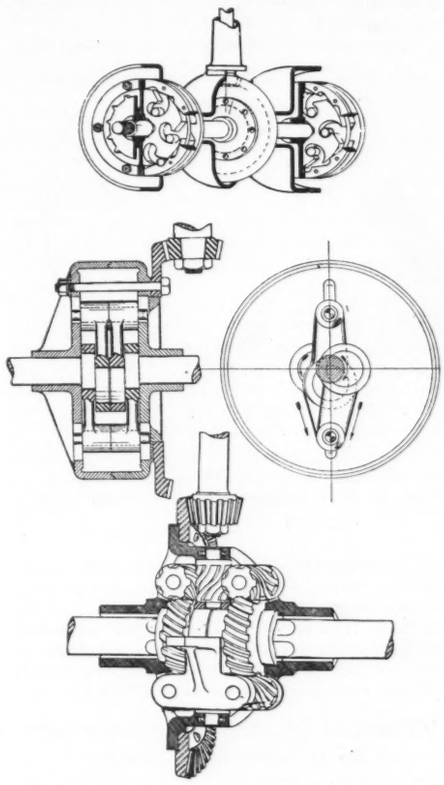
Mr. Ormsby mentions some interesting experiments conducted by street railway engineers in connection with using differentials for street cars, to eliminate the corrugation of rails and wheels, as well as to economize in power consumption. It was indicated that with a street car equipped with a differentiating mechanism about one-half of the power consumed by a car equipped with solid axles would be saved.

The author believes that the ultimate differential will be one which compensates freely for the difference in speeds of the rear wheels when the car diverges from a straight course, and is so constructed that it will be impossible for either wheel to spin when the other has lost traction.

Differential Discussion

The discussion was condensed somewhat to enable the morning's program to be covered. A communication from R. E. Wells, American Gear & Mfg. Co., supplementing Mr. Ormsby's arguments, said that there seemed one difficulty in regard to the design of an ideal differential. What is wanted is a mechanism which will differentiate freely for corner turning and will not differentiate when traction differs in the two rear wheels through changes in the condition of the road surface. In other words, the differential substitute is required to distinguish between difference in traction due to road surface condition and difference in traction due to making a turn. The mechanism cannot be expected to do this.

W. H. Diefendorf, New Process Gear Corporation, spoke in favor of the free-wheel type of mechanism, saying that 15,000 of



Unusual types of differentials. At top, free-wheel axle; center, crank differential in two views; bottom, spiral gear type

these had gone into use during the past year. He said that the friction which is the feature of the spiral type differential must be objectionable, and as proof of its considerable magnitude he mentioned that a car with a differential of this sort exhibited a strong tendency to straighten out again after making a turn. With the free-wheel type, he said, no such action is observable.

Herbert Chase then read a letter from G. W. Smith, Thomas B. Jeffery Co. Mr. Smith gave it as his opinion that the ordinary rubber tire made a good differential as long as the radius of a turn was large enough to make the slip only from 2 to 4 per cent of the total distance traveled. The ideal would be a differential that would allow about 30 per cent but no more, which would cease to act as a differential when the difference exceeded this amount. This would prevent wheel-spinning and yet give perfect action on the sharpest turns.

A. Ludlow Clayden recited some experiences of his with a car of 90-inch wheelbase and 4-foot tread, which he drove for a whole year without any differential. He said that on the whole the advantages and disadvantages were about evenly balanced. He didn't notice any increased tire wear, but there was grave risk of serious damage to a tire that became deflated if an instant stop was not made. He asked Mr. Ormsby what was the backlash in the spiral type differential and whether the internal friction provoked wear which increased this lost motion. The Hedgeland axle made experimentally years ago had a pronounced amount of backlash, and this caused a bump when the throttle was closed and the car commenced to drive the engine.

Ormsby made a short reply, at the request of President Huff, and said that the backlash in the spiral gear was about the same as in the normal type. He had driven a heavy car 12,000 miles with a spiral differential and could not observe any more lost motion at the end than at the beginning. He explained this by saying that the pinions in the spiral gear practically locked solid when any spinning tried to start.

AUTOMOBILE EXPERIENCES IN THE GREAT WAR

By W. F. Bradley

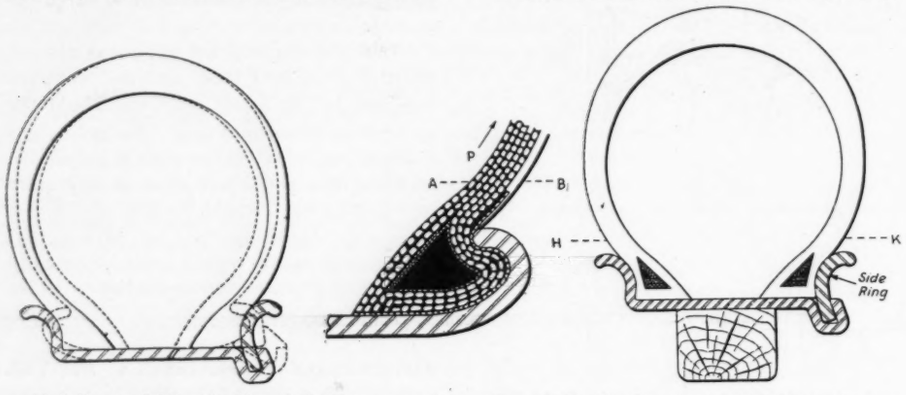
THE author outlines the constructions that have shown up well under war conditions of operation, mentioning especially that four-cylinder engines carried under a hood were the most satisfactory. The internal combustion engine had found favor as compared with the gasoline-electric and steam-driven vehicles. The defects revealed by war service are given in considerable detail, the author finding that all of the trucks used had developed some weak point. Radiators and springs were given as a general source of trouble. The author believes more attention should be paid to the draining off of water from radiator, pump and jackets. The lubricating system for the engines should be of the pressure or circulating type so designed that the dirt will deposit away from the pumps. He outlines a number of operating troubles developed under the existing conditions of operation and gives examples of the way these have been remedied.

Considerable attention is paid to the methods of operating trucks away from made roads. The methods of fitting chains to the wheels, and the use of caterpillar attachments are described. All-metal wheels are being used in place of the wood wheels. Considerable tire trouble has developed; one reason being the tendency for the cambered roads to force one of the dual tires to carry the greater proportion of the load. Dimensions are given for bodies and a number of suggestions made as to their proper construction.

Although practically all the general transportation is done by rear-driven trucks the four-wheel-driven vehicle is used to a limited extent, mainly for operation off the main roads or on no roads at all. A description is given of tractors developed for this service. These are used mainly to draw batteries and heavy artillery. The importance of the armored car has been exaggerated mainly because of the adoption of underground warfare. The author describes briefly the most suitable type of such a machine. One effect of the war has been to bring about the extensive use of trailers, the author stating that they are now being used behind all kinds of automobiles, both for the transportation of men working in the

rear of the lines and for general haulage work around the depots.

In conclusion the paper considers the arguments found in the war zone in favor of standardization. The author holds that such a tendency should be opposed as regards the general features of automobile design. Certain features that can be adopted without handicapping the design should, however, be insisted upon. He gives specifically the size and style of bodies, sizes of wheels and tires, magneto bases and couplings, carbureter flanges, towing hooks, turning radius, clearances, driving chains, and threads for all bolts and nuts as subjects for standardization. He also mentions the necessity for uniform nomenclature inasmuch as a great deal of confusion has been created by the difference in the names of American trucks, not to mention the trouble caused by the variation in English and French terms.



At left, straight side tire, full lines, superimposed on Q.-D. clincher tire, dotted lines, to show differences in shape. Center, details of clincher rim, showing direction of stresses caused by bursting pressure; the portion below the line AB is the bead. At right, straight side tire on two-piece detachable rim

THE FARM TRACTOR

By C. M. Eason

THE author shows the need this country has for farm tractors, due to the fact that, so far, less than one-half of the possible farm resources have been developed.

Reviewing the necessity for developing our tillable lands to take care of ourselves in time of war, it is pointed out that farm production is largely a mater of power. Aside from windmills used for pumping water, the available farm power equipment of the United States consists of about 25,000,000 horses and mules, 60,000 gas tractors, 100,000 steam tractors and 1,000,000 stationary gasoline engines. Large as this total is, however, it only allows one horsepower for each thirty acres of farm land, which is not enough by perhaps one-half or one-third. Inasmuch as horses cannot meet the demand for increased farm power, the tractor must come right away. So far the supply of tractors has been entirely inadequate to meet the demand.

The writer specifies some of the problems which confront designers of farm tractors. To make the tractor immediately available for farm work, it must be adaptable to practically all of the existing types of horse-drawn implements, besides furnishing belt power for a wide variety of present power-driven farm machinery. In designing tractors it must be remembered that the horse is a very flexible unit, capable of a wide variation in power output. The tractor must compete with this. Designing a tractor to furnish power for the majority of farm conditions, requires an intimate knowledge of crops, soils and farm management. These must be analyzed carefully so as to make the machine have as wide a range of usefulness as possible. Mr. Eason dwells on the power required for operation in connection with various crops, including what conditions must be met in the plowing and cultivation. There is a wide variation in this respect as between corn, wheat, oats and other crops. The power required for pulling plows varies from 250 to 1,500 pounds per bottom, depending upon the condition and kind of soil, depth and type of plow. One objection to the tractor is that it must be made to follow the furrows by careful attention from the driver, whereas a horse follows the furrow instinctively.

The author reviews what the tractor must show in the way of economical operation, pointing out that for permanent success it must show higher returns on the investment than horses.

Valuable information is given in regard to the mechanical efficiency, engine efficiency, friction losses, rolling resistance and general design requirements. Other factors peculiar to farm tractor work, which must be taken into account, are treated. The tendency in tractor design is toward better material, greater refinement and higher efficiency.

DYNAMICS OF VEHICLE SUSPENSIONS

By Dr. Benjamin Liebowitz

THE author believes the riding qualities of present motor vehicles are unsatisfactory and that this is due largely to a lack of appreciation on the part of engineers of the fundamental dynamics of the problem. He undertakes to strip the problem down to the consideration of a simple system consisting of a wheel with its sprung weight carried on a simple type of spring and then to analyze the action which takes place when simple irregularities are encountered by the wheel.

Analysis of this problem results in several expressions, the interpreting of which reveals the influence which the varying of specific factors has upon the action of the spring and its suspended load. These expressions take into account the effect of the ratio between sprung and unsprung weight, of speed, of size and kind of irregularity encountered by the wheel, tire inflation, flexibility of the spring, and wheel diameter. Other factors which are considered as a result of interpreting the very interesting curves are the effect of friction in the suspension, and of synchronism. Statements of the betterment which can be looked for in riding and steering qualities as a result of varying different factors are made. The effect of shock absorbers is discussed.

PNEUMATIC TIRE AND RIM SITUATION

By J. E. Hale

MR. HALE follows up the development of the pneumatic tire since its invention by Dunlop in 1888, and shows why there are now several different types of tire construction in use. The main thought expressed is that the straight-side tire is the logical solution of the variety of requirements, in this country, South America and Europe.

Why should the car manufacturers continue to complicate their production processes by making some of their cars with millimeter clincher equipment and others with straight-side, when by proper coöperation between the tire and car makers, the straight-side tire can be introduced quietly into the foreign market, fully standardized? Mr. Hale discusses in detail the merits of the three types of tires; namely, the clincher, straight-side and quick detachable; confining his discussion to energy consumption, traction, total mileage, cost per tire mile, cushioning effect, reliability, ease of applying and service. The results brought out show principally the advantages of the straight-side tire.

Statistics are offered to show the trend of the rim situation, and it is pointed out that it is just a question of time until the quick detachable clincher will cease to survive. It had a legitimate place during the development stage, but with the developed straight-side tires giving entire satisfaction, Mr. Hale holds that there is no excuse for continuing the quick detachable clincher type.

The American standard inch clincher rim contours, the British standard millimeter clincher rim contours, and the American wide standard inch straight-side rim contours will undoubtedly survive all others. However, outside of the rim contours, the rim situation is still in the process of evolution. In the struggle to minimize weight, expense, and tire troubles, the existing demountables may lose ground, particularly as the light-weight one-piece clincher and the two-piece straight-side rims, on either permanent or detachable wheels, apparently offer the next step in progress of this department of the automobile industry.

HIGH-SPEED ENGINES

By A. P. Brush

THE author outlines in a general way the relation of car performance to modern engine development. He considers particularly weight reduction and torque performance of high-speed engines, giving the undesirable characteristics attending the increased torque range gained by higher speed.

He next discusses the relation of torque to total car weight, to acceleration and to hill-climbing ability and suggests a method of determining the value of a car in terms of its performance ability.

The author holds incorrect those systems in which the amount of lubrication is in proportion to speed only; and in which oil for crankshaft and crankpin bearings must cool as well as lubricate them. He shows a system designed to solve these oiling problems.

Static, running and distortion balance of a rotating mass are defined by the author, who shows how they apply to a large number of types of crankshafts. The paper not only deals with the counterbalancing problem as regards the crankshaft itself, but also with the centrifugal effects of the connecting-rod and piston parts. In conclusion a discussion is given of what are correct counterbalancing masses for service conditions.

"The advertising literature of the automobile industry of today naturally leads one to suppose that high engine speed is, **in itself**, for some mysterious reason, a much to be desired end," says the author.

"Before proceeding with my consideration of the problems involved in the design of high-speed engines, I shall make the statement, without fear of successful contradiction, that any increase in engine speed is, **in itself**, a detriment and not an advantage,

and that the only reason for the present tendency to increase engine speeds is that it is the only known means of achieving certain other greatly desired ends.

"From the user's standpoint, these ends, for which we must pay by an increase in engine speed, can be grouped under the single head of quality of performance."

In general, smaller cylinder dimensions, with consequent possibility of smaller valves and lighter non-uniform-motion parts throughout, permit us to secure higher torque per cubic inch of piston displacement at higher speeds without a corresponding loss of torque per cubic inch of piston displacement at lower speeds, and particularly in V types, enable us to secure engines of any desired power that are at once compact, relatively light in weight and with an exceedingly high torque range.

Obviously these advantages are secured only by multiplication of parts. This naturally tends toward the objectionable characteristics of higher initial cost and higher maintenance cost, since a greater number of parts must be maintained in correct working condition if the advantageous results are to be maintained.

POSSIBILITIES OF THE CONSTANT PRESSURE CYCLE

By Arthur B. Browne and Herbert Chase

THE authors, having shown that Otto cycle engines possess certain limitations, notably low thermal efficiency and characteristics which render the use of any but highly volatile fuel exceedingly difficult, state their belief that engines of this type must sooner or later give place to others operating on a different cycle.

The advantages and disadvantages of various other cycles are then discussed and it is shown that only constant pressure cycle engines seem to be well suited to the requirements of motor vehicles. The many advantages of constant pressure engines are then set forth as follows:

1—High mean effective pressure with low maximum pressure.

2—Variable cut-off with constant compression pressure.

3—Adaptability to use of low grade fuels.

4—Superior scavenging qualities.

5—Absence of volumetric losses from which Otto cycle engines suffer.

6—Adaptability to two-stroke cycle.

7—Lower maximum temperatures.

8—Absence of complication because no fuel or starting pumps are necessary.

The reason for slow development of constant pressure engines are then given and a new form of constant pressure cycle engine is proposed and its operation fully described as is also a special burner giving "flameless combustion," the latter being an essential feature of the engine. This engine compresses into a receiver, heats it with exhaust gas and expands it **at constant pressure** by adding heat, due to combustion of fuel in the burner, as the air enters the working cylinder. Both compression and work take place in the same cylinder. The operation is practically the same as that of a steam engine, but is accomplished without a boiler, condenser or other accessories used with a steam engine. The proposed engine is said to possess all the advantages of the steam engine without any of the latter's complications or disadvantages.

As applied to motor cars the proposed engine is said to possess the following among other advantages:

(1) It renders readily available for use cheap fuel such as kerosene and fuel oil.

(2) It is thermally efficient at all loads because of constant compression pressure, utilization of exhaust heat, etc.

(3) It has lower maximum pressures, higher mean effective pressure and more constant torque than Otto cycle engines. It will therefore be freer from vibration and will be lighter itself than Otto cycle engines. For this and other reasons cited its use will result in lower car weight.

(4) It has a large overload capacity and therefore requires no changed speedgear.

(5) It may operate on a two-stroke cycle with all the advantages and none of the disadvantages of two-stroke Otto cycle engines.

(6) It requires no starter and is expected to be free from carburetion and carbonization difficulties.

(7) Its use will result in simpler car control since no change speed gear on spark advance mechanism will be required.

(8) It will be readily reversible.

REFINEMENTS IN TRUCK DESIGN

By H. D. Church

THE author describes a number of detailed developments that took place during the working out of a line of worm-driven trucks.

The details of front axle and steering parts are dealt with at length, the reasons for the final constructions being clearly explained and the constructions themselves well illustrated.

Details concerning difficulty with the Hotchkiss type of drive on heavy trucks, troubles with driveshafts and lubrication of the worm wheel are all covered thoroughly; spring shackle construction and lubrication, radiator and hood mounting come in for detailed attention and the question of governors is interestingly covered.

Brief reference is made to the influence of unsprung weight, the differences between truck and pleasure car practice in this respect being pointed out.

MECHANICAL TRANSPORT MOBILIZATION

By Arthur J. Slade

THE paper opens with a number of quotations from publications issued by the Army War College and showing the bearing of motor transport on a proper military policy for the United States. The author then describes two experimental trips recently made by motor-truck owners near New York in an effort to determine proper motor-transport operating conditions. A statistical summary is given for these two experimental trips.

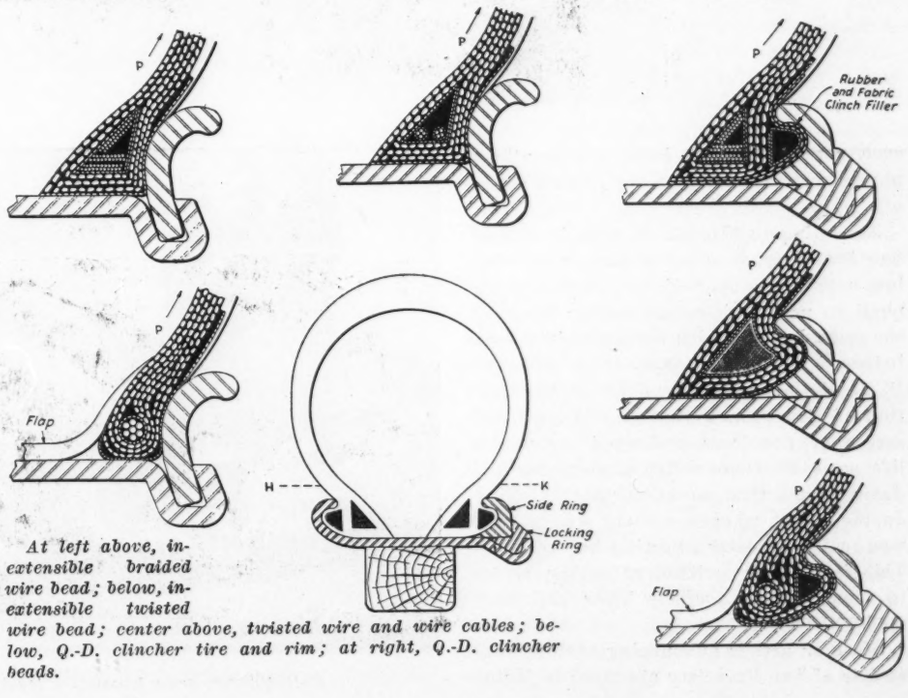
A number of owners and operators of motor trucks ranging from an installation of one vehicle up to fleets of several hundred machines have interested themselves in the conduct of experiments and test runs with a view to placing at the disposal of the War Department, not only their experience and personal services as motor transportation experts along commercial lines in times of peace, but also such data and information as can be secured by experiments in operating companies of motor trucks in convoy, determining the number of officers, orderlies, drivers and mechanics, the emergency material necessary to be carried for the temporary repair of roads and bridges, the quantity and character of repair parts for the trucks and the commissary and quartermaster's equipment and supplies necessary to make each transport company an entirely self-sustaining unit.

LARGE SINGLE VERSUS DUAL SOLID TIRES FOR TRUCKS

By W. H. Allen

THIS paper is mainly an argument in favor of the use of large, single rear wheel truck tires instead of smaller dual tires. Although the practice of using large singles is comparatively new, the author gives the results of experience and research to show the advantages of the newer method of rear tire equipment.

In developing his arguments in favor of single tires, the author goes into the history of dual tire application to show why it was necessary to use two tires in the earlier days of truck operation. As the necessity for increased carrying-capacity grew, tire manufacturers found the then existing single tire equipment inadequate, and they set about to develop suitable equipment to meet the new condition, the result being dual practice. According to Mr. Allen, dual tires were supposed to have a carrying capacity 2½ to 3 times that of a single tire of the size of which the combination was composed. The method of attaching the earlier dual tires is shown to have been poor, inasmuch as the cross bars tended to draw the rubber together in such a way that it was impossible to secure the same degree of friction over the entire base, owing to the outward spring which took place in the center of the cross bar, thus relieving compression under these bars. This reduced the stability.



At left above, inextensible braided wire bead; below, inextensible twisted wire bead; center above, twisted wire and wire cables; below, Q.-D. clincher tire and rim; at right, Q.-D. clincher beads.

Non-Skid Pavements Now Used in San Francisco

One Physician Already Endorses the Construction as a Preservative of Human Life

SAN FRANCISCO, Cal., June 19—A paved street, which will prolong the natural life of a human being 20 years, approaches the goal of the old chemists who sought an Elixir of Youth. The city of San Francisco now possesses streets of such potency that at least one reputable physician will certify to the powers thereof.

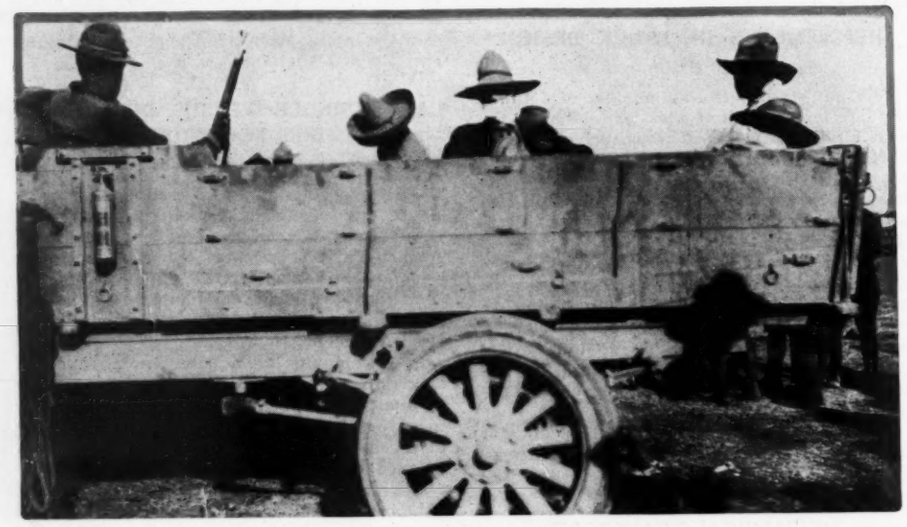
According to this M. D., well known in San Francisco, it is not necessary to swallow a pill composed of San Francisco asphalt to prolong life, but merely to enjoy the mental quiet which the non-skid streets induce. The doctor says, in a letter to D. J. McCoy, superintendent of construction of streets and wharves, "I am quite sure that you have prolonged my wife's life some 20 years. Her anxiety for the dumb brutes that were constantly falling on the street whenever there was a rain, was really seriously affecting her health." This letter was written after the street in front of the doctor's home had been made non-skid.

Since an article announcing the non-skid streets of San Francisco appeared in Motor Age inquiries have been received from many sections of the United States concerning the safety first pavement. Kansas City, Seattle, San Diego, Santa Monica, Cal., and even Columbia university have asked for detailed information. Now that a physician's endorsement and recommendation has been received, there may be a flood of inquiries from patent medicine men who wish to serve humanity by offering sugar-coated asphalt pills, absolutely guaranteed to prolong life and health, grow hair and remove grease spots.

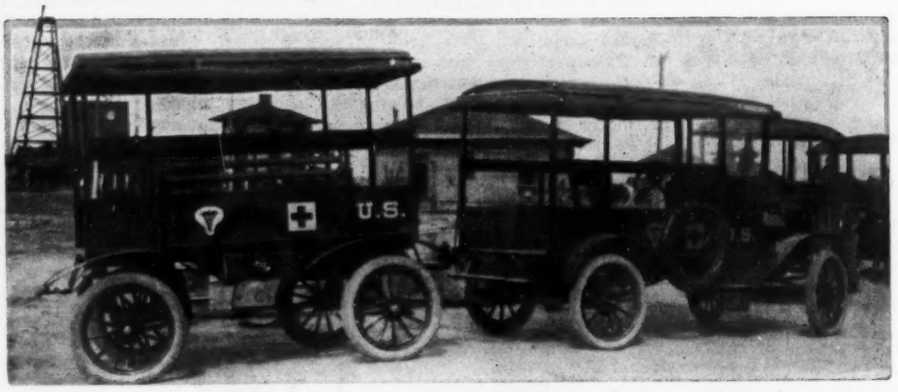
But disregarding the alleged hygienic value of these non-skid streets of San Francisco, there is a practical interest in the safety pavement which is worth the attention of every motorist, taxicab passenger, truck operator and pedestrian in the country.

Every day in many of the large cities of the United States, accidents occur on account of slippery streets. Broken limbs, lost lives, damage suits, garage bills, and shattered nerves are all charged to the slippery street that slid "out from under."

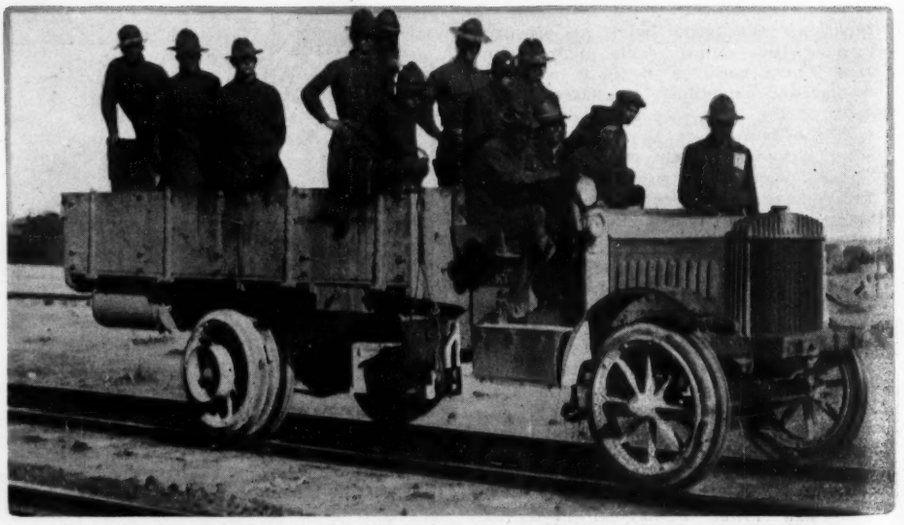
San Francisco's method of producing the non-skid street is simple. It has always been contended by highway engineers that if the street was made rough, the motor cars and horses would hold traction. But the rough street has not been the easiest



Above — Villa prisoners, captured in Mexico, starting to the United States for trial. Seven prisoners have recently been tried and sentenced to death at Deming, N. M.



Fords are used to draw trailers for the army red cross in Mexico. The trailer is of very light weight to reduce the strain on the driving chassis



United States army locomotive truck fitted to run on Mexican railroads

thing in the world for the engineers to develop; and there have been countless objections. City streets must be kept clean. A city street also must be smooth in order to induce rapid traffic movement.

A rough street will give traction, but to get a street not so rough that it makes driving uncomfortable and collects dirt and dust, has been a problem.

Several schemes have been tried in San Francisco. The first, the use of heavy, coarse sand in the top dressing of asphalt paving, was a failure. A stretch on Market street was so prepared, using a mixture of sand and asphalt for the surfacing. The sand was not gritty enough to eliminate the dangers from skidding and worse still, the grains loosened like small settings in a finger ring, cutting the surfacing loose.

The second scheme tried out was to mix crushed rock with the surfacing and then to roll the whole pavement smooth with a heavy, fifteen-ton roller. When the first stretch was put down, some tax-paying motorists voiced disapproval to the board of supervisors; but now these motorists fully approved of the non-skid streets and use them whenever possible on wet days. Such an exclusive body as the draymen's union has openly endorsed the rock-and-asphalt movement, to say nothing of many improvement clubs and civic organizations.

The rock-and-asphalt surface has made good in San Francisco. Approximately 8 miles of this pavement have been laid in the city, the method being used on all new work and for re-surfacing.

How to Make a Non-skid Street

D. J. McCoy, the inventor of the method, gives these specifications for building a non-skid street: Prepare the base and binder by the same method used for smooth asphalt paving. The only special treatment is that done to the surfacing. Hot, restored asphalt of the thickness desired is spread, a surfacing heating machine preceding and heating the binder. On this unrolled surface-asphalt, a good quality of No. 3 rock, passed through a 1- or 1¼-inch mesh, is spread. Then the roller moves over the mass, packing the rock down into the surface. The rocks are of sufficient size to reach the surface, which in the finished street presents a curious pocked appearance.

The slight unevenness caused by the rocks gives a surface which is full of tiny hills and valleys. The rubber of tires grips these small projections and makes skidding extremely unlikely, while teamsters find that their horses secure a much better foothold on these streets than on the smoother pavements, including cobble stones and brick.

Judging from the experience of three years, the method appears to be absolutely successful. For 3 years experimental work with this non-skid method has been conducted, the idea proving successful before any great amount of the city arteries were surfaced.

Objection to Taxi Fare

Wilmington Public Utility Commissioners Stumped by Novel Case

Officials May Have No Authority in Appeal of Non-Resident

WILMINGTON, Del., June 19—The board of public utility commissioners of Wilmington has a knotty problem on its hands. A complaint having been filed by a non-resident against a local taxicab company, objecting to what the complainant considers an exorbitant charge for a ride to a point 90 miles from Wilmington, the commissioners feel that they should take some steps looking toward the regulation of the business at least in Wilmington, but whether they have jurisdiction outside of town is a question, as their authority is purely local. As a matter of fact, it is a question whether they can regulate the taxicab business even in the city, though they have authority over public service corporations.

On May 28, George J. Fall of Coatesville, Pa., writes the commission, while en route to Easton, Md., he missed the last train out of Wilmington that would make connection that night, and, as he had to be in Easton the next morning, he engaged a taxicab for the trip. The weather is said to have been stormy and various kinds of trouble were encountered, with the result that seven hours were consumed in going the 90 miles. However, time was taken out for delays, but as the price charged—the regular rate—was $3 an hour, he was charged for 12 hours, 6 each way, or a total of $36. He thinks he should not have paid so much, but as the taxi was covered with mud and minus two mud guards when it reached the garage on the return, the taxi company does not consider that it was overpaid. At all events, the regular rate was charged.

The public utility commissioners, it would seem, have no power to consider the complaint, except insofar as it concerns Wilmington, but they have taken the initiative toward the regulation of the service in Wilmington and have asked each of the companies to file its tariffs with the board, and the result may be the establishment of fixed rates and requirements to have the rates conspicuously posted. A member of the board, in discussing the matter, said it might be well to have blank forms of contract for long trips, to be signed by the contracting parties, in which event there will be no misunderstanding.

HIGHWAY TOUR STARTS

Rensselaer, Ind., June 20—Special telegram—Over a well-marked and for the most part good road the motor caravan inspecting the Jackson highway from Chicago to Nashville, Tenn., arrived here at 6 p. m. on the first leg of a five- to seven-day tour. Indiana delegations met with those from Chicago and officials of the road, and the start was made at 10 o'clock.

The first stop was Crown Point, where the local Chamber of Commerce acted as host. Dinner was arranged at Cedar Lake and afterwards President Peter Lee Atherton, of the Jackson highway, told of the accomplishments made so far toward joining sections of different roads that go to make up this route which eventually will give a good motor road from Chicago to New Orleans.

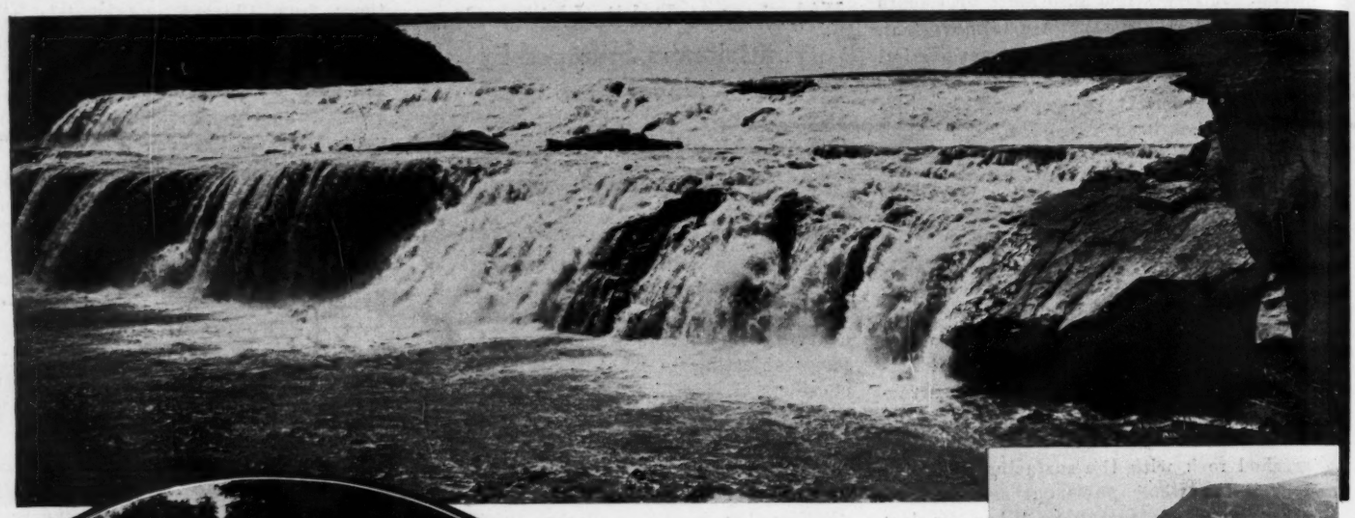
At the Kankakee river a delegation from this city met the tourists and escorted them to Rensselaer. Tonight there will be a road and general get-together meeting. Wednesday's run is to Indianapolis with noon stop at Lafayette. Louisville will be reached Thursday and Maysville, Ky., Saturday. Then the party will return to Louisville and make the trip to Nashville in 2 days.

BOUR-DAVIS BUILDING

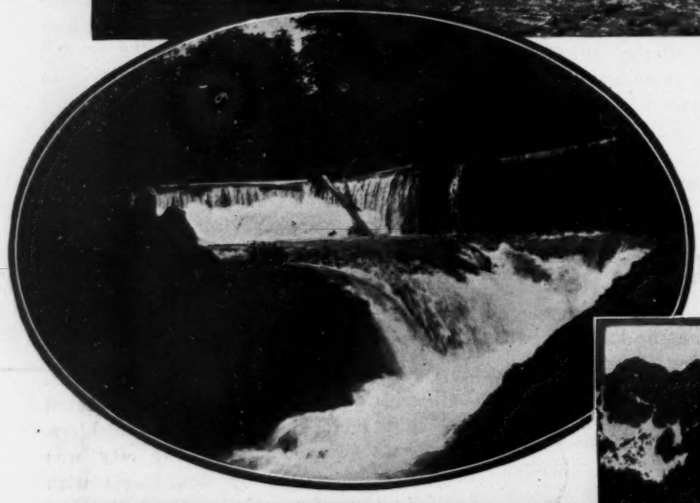
Detroit, June 16—A modern factory building of four stories is being erected at Fort and 23d streets, this city, for the Bour-Davis Motor Car Co., organized about 1 year ago to manufacture cars in the $1,250 class. The plant will have a capacity of about 30,000 cars, although that output will not be attempted the first year. Deliveries on the new model are expected to begin some time in July to dealers. Land on the east side of the city was originally purchased by Bour-Davis with the intention of erecting a plant thereon, this being on the Terminal railroad close to Hudson and Metal Products plants, but this project was abandoned and the property sold, when it was decided to build on the west side.

The complete official roster of the Bour-Davis company is now available, and indicates that the new concern has strong backing. Charles J. Bour, president National Railways Advertising Co., vice-president of the Chicago, Duluth & Georgian Bay Transit Co., and a director in several other large corporations, is president; R. C. Davis, head of the Chicago, Duluth & Georgian Bay Transit Co., is vice-president and the operating director; C. F. Stewart, who has long been connected with the sale of motor vehicles, principally as distributor for well-known makes in the Pittsburgh field, is the Bour-Davis vice-president and sales manager; and A. A. Gloetzner, well known in the trade through his engineering connections with several of the prominent companies, and lastly assistant engineer of the Chalmers Motor Co., is chief engineer and production manager. The directors are Messrs. Bour, Davis, Stewart and W. J. Harahan, who is president of the Seaboard Air Line Ry., and a director in many other enterprises of prominence.

America's Western Water Falls—Finest in World



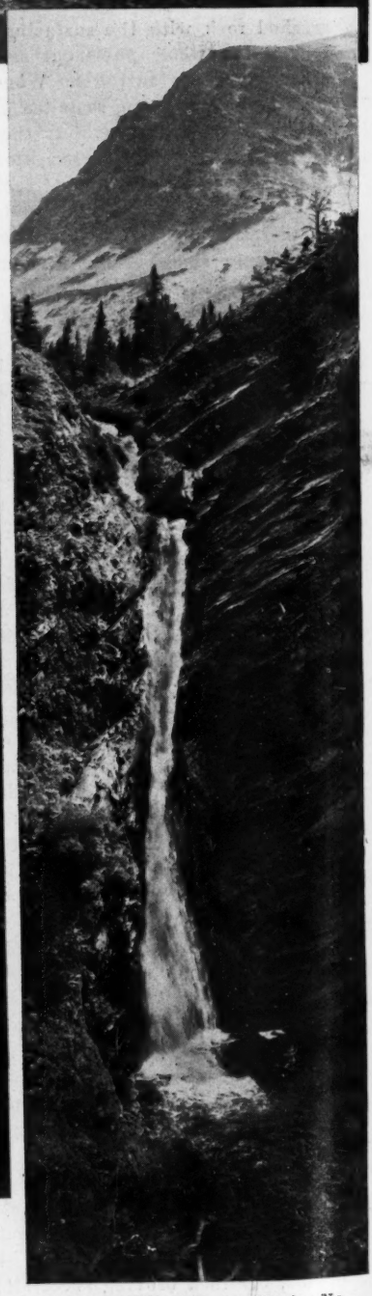
Great Falls in the Missouri river, which gives the city of Great Falls, Mont., its name



Left—Tumwater Falls, 2 miles south of Olympia, Wash., and a short distance from the Pacific highway. Just below this point the waters of the Deschutes river are lost in Puget Sound

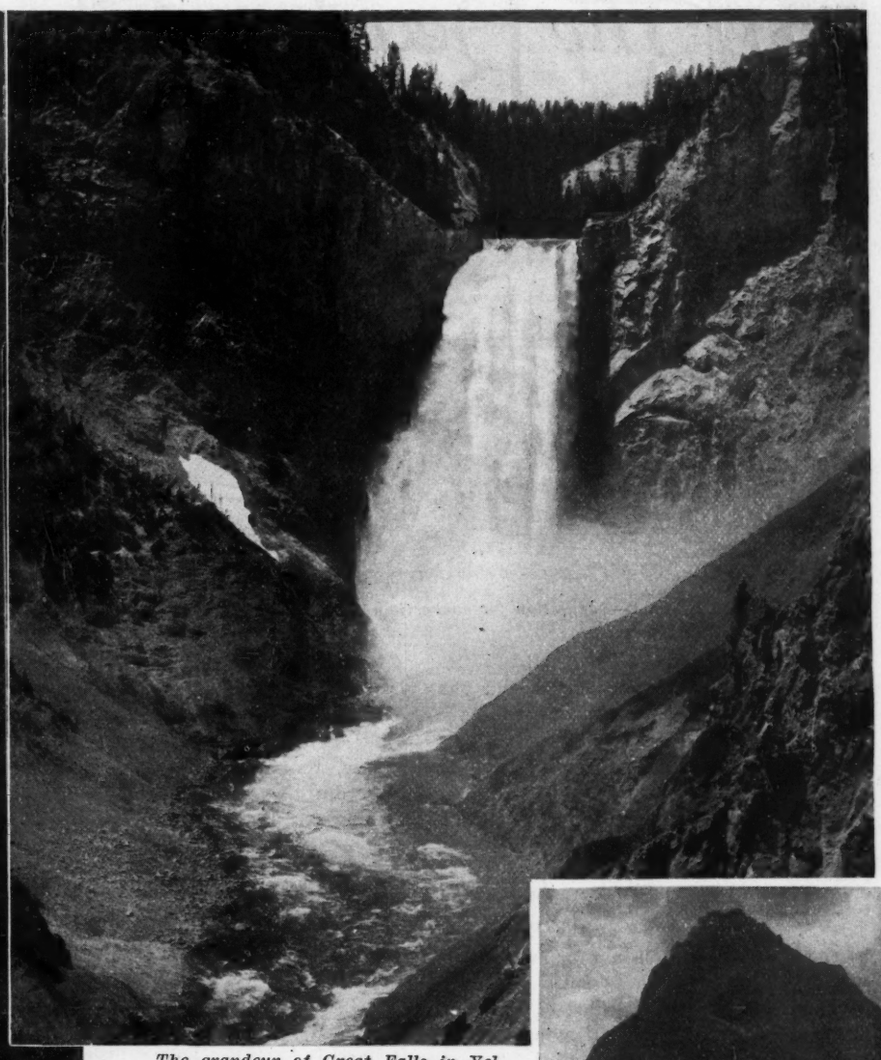
Narada Falls, one of the wonderful water views seen from the government highway to Paradise valley in Mt. Rainier National Park

Snoqualmie Falls on the Sunset highway in Washington. There is a distance of 268 feet from the brink to the placid lake below and the volume of waterfall is tremendous



Louis Hill Falls in Glacier National Park, named for the son of the great empire builder, James J. Hill

Multnomah Falls on the Columbia highway in Oregon are 700 feet high and one of the most beautiful in all the West. The volume of water compared with the height is smaller than any falls in the world



The grandeur of Great Falls in Yellowstone park is appealing to everyone who sees them

The upper falls in Yellowstone National Park pitch downward between precipitous walls lined with coniferous trees

McDermot Falls in Glacier National Park are guarded by Grinnell mountain, which stands like a sentinel over them

The Readers' Clearing House

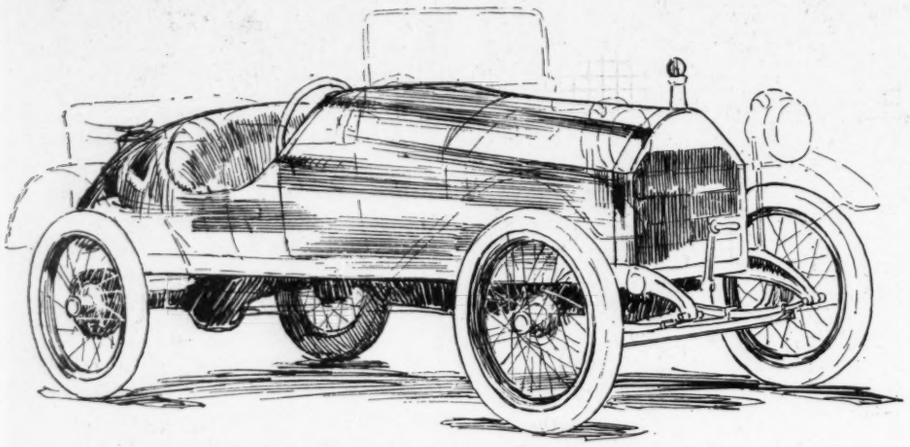


Fig. 1—Suggestion for converting 1912 Hup into speedster

GEARSHIFTING REQUIRES PRACTICE

Proper Relation Between Engine and Car Speeds Should Be Maintained

ELVIDERE, Ill., Editor Motor Age—Kindly explain how to use the gears of the Dodge car in going up steep hills so as to make the shift easily and quietly.

2—Should the shift from high to second be made at a certain speed of the motor relative to the speed of the car?

3—Can the shift from second to low be made when the car is moving without injury to the gears?

4—What is meant by double pedaling when shifting gears?—T. G. Marriett.

1—Shifting the gears of the Dodge car is the same operation as for any other car. Gearshifting without noise is merely a matter of practice. Throw the gear quickly and firmly without allowing the teeth to grate against each other. Do not wait until the car has slowed down almost to a stop before trying to shift from high into second, for then the shift ought to be into low instead. You know from running the car about how fast it normally runs in either gear, and when it drops below the speed that is customary on a certain gear, shift immediately to the next lower.

2—While there is no predetermined speed of the car at which a shift should be made, whenever you know that you should shift, do it at once, and do it quickly before the car loses more speed.

3—Yes.

4—There is no standard expression of this kind, and it might mean a variety of things according to the idea of various persons.

Hudson Power Curve

Montezuma, Ia.—Editor Motor Age—Kindly publish power curve of the Hudson Super-Six at different motor speeds.

2—What advantage has this motor over the ordinary motor of same dimensions at, say 1,000 r.p.m.?

3—Very few motorists care to operate a motor at over 1,700 or 2,000 r.p.m., even on first or second speeds. I desire to know whether the Super-Six design and construction has any advantage over the old 6-40 Hudson for the ordinary user.—W. E. McKee.

1—Power curve of the Hudson Super-Six is shown in Fig. 2.

2—Being very accurately balanced, it should run smoother.

3—It has a great many advantages. It is a smoother running motor, has a great deal more power and is quieter, among other advantages. Being a higher-speed engine, its normal speed is higher, and therefore at any given car speed, it is turning over faster than did the old engine, due to being geared down more.

WHICH LOSE COMPRESSION MOST?

Reader Thinks Large-Bore Motors Permit Greater Leakage When Worn

Atlanta, Ill.—Editor Motor Age—In regard to motors with small cylinders, say less than 3-inch bore, as used in some of the six- and twelve-cylinder cars, will these motors lose compression quicker than a motor of larger bore? It seems to me that a large cylinder where the circumference is greater, when the cylinders get worn, there will be greater loss of compression due to more space for loss of compression.

2—Will a small-cylinder motor carbon worse than a large-cylinder motor?

3—Does Motor Age think the small-cylinder, small-bore motor with more cylinders eventually will take the place of a great many four-cylinder cars?—Subscriber.

1—There ought not to be much difference.

2—No.

3—There will always be plenty of room for the four as well as the multi-cylinder engines.

Some Information on Hup

Milwaukee, Wis.—Editor Motor Age—What is the weight of the 1916 Hupmobile, roadster?

2—What was the weight of the 1912 Hupmobile roadster, small model?

3—What price did the small Hup sell at, 1912 model?

4—Could the 1912 Hup be made into a speedster? If possible, kindly illustrate.

5—Did the small 1912 Hup have the Breeze or Zenith carbureter?—G. A. Kysely.

1—2,835 pounds.

2—Chassis weight, 1,800 pounds.

3—$975.

4—Sketch of a suggested way to convert this car into a speedster is shown in Fig. 1.

5—Breeze.

Seeks Data on Jeffery Six

Milwaukee, Wis.—Editor Motor Age—What power is developed at 600, 1,200 and 1,800 revolutions per minute in the 1916 Jeffery Six?

2—At what engine speed is the maximum power developed, and what is it?

3—What is the gear ratio on this car?

4—What is the bore and stroke of the motor?

5—What is the gasoline mileage?—R. L. Case.

1—At 600 revolutions per minute, 17.5 horsepower is developed; at 1,800 revolutions per minute, 50 horsepower is developed, and at 1,200 revolutions per minute, 36.5 horsepower is developed.

2—2,100 revolutions per minute would develop 52 horsepower.

3—The gear ratio is 13.54.

4—The bore and stroke is 3 by 5 inches.

5—The miles derived from a gallon of gasoline is from 12 to 16 miles.

WOULD CHANGE VALVES ON FORD

Best to Have This Done by Expert—Bore Changing Not Advisable

Detroit, Mich.—Editor Motor Age—I have a Ford car which I wish to convert into a racing car to compete in the Ford races to be held here on July 4. Would better results be obtained by putting in larger valves or by having the cylinders rebored?

2—Kindly give the best known valve timing that is known for speed work on a Ford.

3—I am going to use a Bosch magneto. Would Motor Age advise taking out the Ford magneto to lighten the flywheel?

4—Would it be advisable to use a 3 to 1 axle and 31-inch tires on a 1-mile dirt track?

5—Kindly suggest a good carbureter to be used on this car.

6—Is there any possible way that I can counterbalance the crankshaft?—J. J. Garrison.

1—Neither of these things would be very practical. Better leave the cylinder bore alone, and you are advised not to change the valves unless you are expert at such work.

2—We have no good data on this. Most satisfactory timing can only be determined by trial.

3—No.

4—These are good changes to make.

5—Any of the well-known makes.

6—No.

DO TOOLS AFFECT MAGNETO?

Reader Asks for Action Magnets—How to Recharge

Huntingburg, Ind.—Editor Motor Age—Will a magneto lose magnetism when working around it and accidentally get tools in the magnetic field of the magnets—so as to touch the magnets?

2—Should the tools be pulled away fast from it or slow, and in what direction so that it will not loose magnetism?

3—Will hammering around the magneto make it lose its magnetism?

4—Can magnets of a regular magneto be recharged without taking the magneto out of the car?—C. H. Schlundt.

1—No.

2—Working around the magneto should not hurt it and it is not necessary to be very careful how you take tools away from it.

3—Not ordinarily.

4—No.

Noise in the Rear Axle

Camp John Hay, P. I.—Editor Motor Age—The engine and running gears in my Ford car are perfect, except when the car reaches a speed of 17 miles per hour, when there is a very distinct grinding sound. I cannot tell if it is in the differential gears or is transmitted back from the transmission, but it sounds very much to all mechanics who have listened to it as if it is in the differential. When the car reaches a speed of 25 miles per hour this grinding noise stops. Can Motor Age tell me how to remedy this?—J. H. Neff.

This might be caused by improper adjustment of the axle gears. Better have the axle taken down and overhauled.

WHY MUFFLERS SOUND DIFFERENT

Design and Power of Motor Are Contributing Factors

Cleveland, O.—Editor Motor Age—What are the causes that contribute to the volume of sound that comes from the cut-out of some cars, such as the Mercer? Example, the difference between the Cadillac Four and the Mercer, etc.

2—What causes the sound, not mechanical sound, that comes from some motors with the cut-out closed?

3—Does the size and shape of the exhaust system have anything to do with it?

4—Does not the Stutz use a Wisconsin motor in the Type A? If not, what—R. E. Wolft.

1—Differences in muffler design and the power of the motor.

2—You hear the muffler explosions, they not being entirely silenced.

3—If the exhaust pipe is large it acts as a horn does, and intensifies the sound.

4—Yes.

GYMNASTICS IN GAUGING THE OIL

Try the Oil Level by Slipping Something Under the Overflow Cock

Belmont, Wis.—Editor Motor Age—I have a model 32, 1916 six-cylinder Oakland, and desire some information regarding the oiling system. As the model now is equipped, in order to see if there is sufficient oil, it is necessary to press a stem on the left side of the engine, and while doing so get down and look under the car. If there is a small dripping coming out of a small pipe underneath the car while I am pressing down on the stem at the top, then there is enough oil. This is all right, but it necessitates getting under the car to find it out. Is there not some way of placing a glass dial, or some similar arrangement, on the side of the engine to indicate at all times the amount of oil? If so, kindly give a sketch and also state opinion in regard to it. I have seen similar arrangements on other cars and am wondering if it could not be made to fit my Oakland.—Ira C. Peavey.

Although Motor Age could suggest a device which would meet your needs we are of the opinion that the cost of installing it would not pay for its worth. Possibly you are overcautious in watching your oil gauge. The Oakland model 32 will lubricate properly as long as oil passes through the sight feed gauge on the dash no matter how low the oil level is in the crankcase. When you do find it necessary to test the oil level, why not shove a piece of paper or a board under the oil gauge, press down the lever, then draw out the paper or board and see if oil has dropped onto it? This will save twisting yourself under the fender when you are pushing down the lever.

OILING OF AN AMERICAN TRAVELER

Sight Feed Gauge Receives Oil From Auxiliary Pump

Baltimore, Md.—Editor Motor Age—I have a 1913 American underslung, 50-horsepower Traveler. This car has four speeds. What is the gear ratio on high speed? The third speed is fine for town driving—is it designed for extensive use, or will considerable driving on this speed soon wear the same out

2—This car has a circulating oiling system, with dash adjustment and sight feed. How can one determine the proper adjustment

1—The high-speed gear ratio of the standard job was 4.02 to 1. If your gears are not noisy there will be no harm done in driving third speed.

2—When oil is poured in the crankcase of the motor it settles to the bottom of the crankcase proper. Inside of the crankcase is a sheet metal trough with holes in the bottom to permit the entrance of oil. When the motor is standing idle the oil will enter this trough from the crankcase until the level of oil in the trough and crankcase are equal.

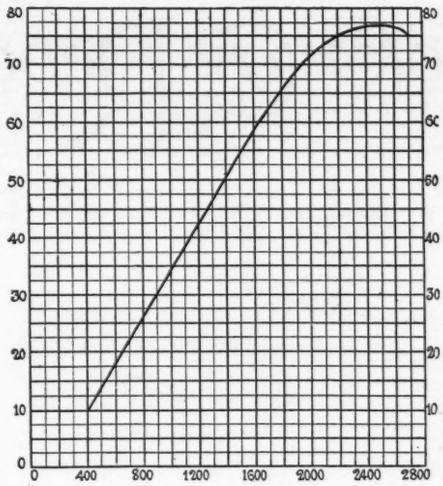


Fig. 2—Power curve of Hudson Super-Six

When the motor begins to operate, however, the small copper tubes or dippers found at the bottoms of the connecting rods dip into this oil and force it up to the connecting rod bearings. Any oil not actually used up in the bearings or other parts inside the crankcase runs down the walls and back through the holes in the trough. As more oil is thrown out of the trough than can flow into it, owing to the small size of the holes, the level of the oil inside of the trough will rise above that inside of it until the weight of the oil outside of the trough is enough to force just as much oil through the holes of the trough as is thrown out by the connecting rods.

By this means the level of the oil in the crankcase is kept constantly correct for running. It is entirely automatic and requires no attention on the part of the operator beyond seeing that the right amount of oil is in the crankcase. The oil pump is provided to pump oil to the sight feed on the dash. If the level of the oil should fall below that necessary for the proper lubrication of the motor the lump will receive no oil—hence none of it will pass through the sight feed.

GIVES THEM A LIFT

With reference to the article in June 8 Motor Age, Ethics of Motoring, in the sixteen years I have driven and sold motor cars I have picked up thousands of people walking over the route I am using, both in the city and in the country. I never pass one on the road when my car is not loaded without taking them in, but I have read many times where other motorists have gotten the worst of it by an accident in which the people assisted have brought suit and been awarded damages by the courts, and I believe the good-hearted motorists have been made forever pessimists on that score. I have never had an accident, not because of luck, but because of physical makeup that does the right thing so quickly as to appear automatic in its performance, but if I were to meet the ungrateful ingrate that would stick me for my accommodations if he were the victim of an accident of mine, I believe I would forever quit it.

DOUBLE IGNITION IN A T-HEAD

Reader Wonders Why Two-Plug System Is Not Universally Used

Manchester, N. H.—Editor Motor Age—I was interested in your article on ignition in your issue of May 25, and especially on two-plugs for T-head motors. Can Motor Age give any good reason why engineers in building some of the American's finest cars using T-head motors do not use two point ignition, and why, when it has so many apparent advantages over single point, is it not used more on racing cars?—Carl S. Fuller.

This is a matter which lies entirely in the opinions of the motor car engineers. It is very probable that they do not all agree with the arguments set forth in the article you refer to and may have as many arguments against the system as the article advanced for it. Racing cars almost universally use overhead valve instead of T-head motors. Double ignition is found on them to a great extent.

TWO AND FOUR CYCLES COMPARED

Reasons Why Power Increase Is Not Doubled With Same Motor Size

Rankin, Texas—Editor Motor Age—Is a two-cycle motor supposed to have twice the power of a four-cycle of the same bore and stroke If not, why not?

2—What is the difference between the A. L. A. M. rating of horsepowers and the other ratings?

3—Kindly give the method of figuring the horsepower of a motor car, according to the A. L. A. M. formula.—R. P. Rankin.

1—It is not, because the method of inlet and exhaust is not as positive as in a four-cycle motor, thence the intake charge and scavenging of the motor conflicts slightly. Furthermore, if the two-cycle were to be doubly as powerful as the four-cycle the friction would have to be cut at least in half, which is of course impossible. Power loss from such causes as cooling water, direct radiation from the exhaust gas and exhaust pipe, and muffler resistance would have to be proportionately reduced to double the power.

2—The American League of Automobile Manufacturers has changed its name to the National Automobile Chamber of Commerce, and the A. L. A. M. horsepower rating is now known as the N. A. C. C. rating. It differs from brake horsepower in that it is computed from formula based on the motor size, while the former is computed from the friction the motor will overcome when operating at the speed which gives maximum power.

3—N. A. C. C. horsepower rating is computed from the following formula, D being the diameter of the cylinders, N the number of cylinders and H.P. the horsepower:

$$\frac{D^2N}{2.5} = \text{H.P.}$$

at 1,000 feet per minute piston speed.

The Motor Car Repair Shop

Electric System Troubles and Their Remedies—Part III

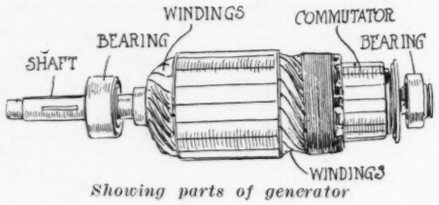
THE preceding article in this series dealt with further troubles that result in either all or part of the lights going out or becoming dim when the engine is running. Chiefly, troubles within the generator itself were taken up, and while these are not the only defects that will cause lighting difficulties even when the engine is operating, they are among the most important and first to look for. However, there are a number of ways in which an open circuit somewhere in the lighting system might result in this defect.

Therefore, proceeding next to the open circuit lighting troubles, which would result in all or some of the lights getting dim or going out when the engine is running, it is well to point out at the outset that, as might be expected, open circuits usually come from broken wires or from loose or disconnected terminal wires at one or more of the electrical units of the system. In most connectors the wires are soldered when the system is fitted, and if one of these becomes dislodged due to the solder having become crystallized or jarred loose, the wire does not take long to work its way entirely free of the terminals. Often it is hard to find such defects unless the terminals are each carefully examined with this thought in mind. There are many instances where a connection looks to be all right, but which in reality is no connection at all when investigated closely. Sometimes when the connector is all right the fault lies in the binding post nut having worked loose or fallen off, with the result that the terminal can move around on the post, causing a very poor contact, if any.

Try Bulbs First

Do not mistake simply a burned out lamp filament for trouble in the system. Too often the driver will examine the bulb that does not light and failing to notice the broken filament will cause himself a great deal of trouble tracing the connections throughout the system, when in reality there is nothing but the lamp itself to blame. If you cannot see plainly whether the dark bulb is broken or not, try a known good one, and if that too fails to light it is time to delve deeper into the wiring intricacies. One of the first points to look is at the light switch to see if there are any defective connections here. Then examine the wires going out of the socket, for this is a very common point of open circuiting. Shaking of the wire due to continuous road work will often work the wire end loose from the binding screw, which is a none too permanent connection anyway due to the space limitations.

So far, we have devoted our attention



Showing parts of generator

entirely to those troubles that come to the lighting system when the engine is running. Having touched upon practically every possibility that could cause this condition, we can now turn to the things that might prevent the lights from behaving properly when the engine is not running.

The first thing to expect when they go out or get dim under these conditions is that the battery has become discharged through some cause or causes. Besides short circuits, batteries can become discharged in a number of other ways, the most common of which are the result of overloading the starting or the lighting system, the electrolyte being too low in the cells, or the battery being loose in its container so that it can move around and become damaged.

Current Leaks

Short circuits have been fully covered in the first installment of this series, so that we can pass to the next source of annoyance. This is battery discharge due to lighting or starting overloads. Naturally if there is leakage of current due to a short circuit somewhere, the generator and the entire system are called upon to furnish more energy than would be required normally, and this overloading results in battery drainage.

A good way to tell if there is current leakage is to note the position of the indicator hand of the ammeter when the engine is not operating and no lights are on. The hand should point to zero, since no current is being demanded nor any being put into the battery. Unless the instrument is out of calibration, if the hand indicates that current is being used, then it is time to look up leakage points. To make sure if the ammeter is correctly calibrated, disconnect one of the battery terminals and see if the hand then swings to zero; if it does there is leakage. But if it remains one side or the other of the zero mark, the trouble is in its calibration, and it is well to remember how much it is off, for future reference, in reading the instrument.

One thing that often makes for battery discharge is the utilization of lamp bulbs that are not of the size or kind required, this being due either to carelessness or ignorance. It is a mistake to put in lamps of higher candlepower than the system is supposed to use. Ordinarily the headlights are 16 candlepower, the sides or dimmer lights 4 candlepower, the taillight 2 candlepower and the same for the dash light bulb.

These will draw a maximum load of about 8 amperes, and as larger lights draw a proportionately greater amount, they make an overload on the system, to the detriment of the battery. Many inefficient bulbs are on the market, usually offered at prices below the standard figure for the bulbs of various sizes, and these are advised against, as they draw a high amperage and their light is inferior because of poor filaments, etc. You can readily see that unless the generator is set or designed to produce a current in excess of that demanded by the lights, it is a bad thing to connect in other sources of current consumption such as auxiliary lights, trouble lamps, cigar lighters, horns, etc., without first making sure that the system can handle them by communication with the manufacturer of the lighting and starting system or a service station that knows its business. You cannot draw more current than the generator can replace, without sooner or later giving the battery the worst of it.

Conserve the Current

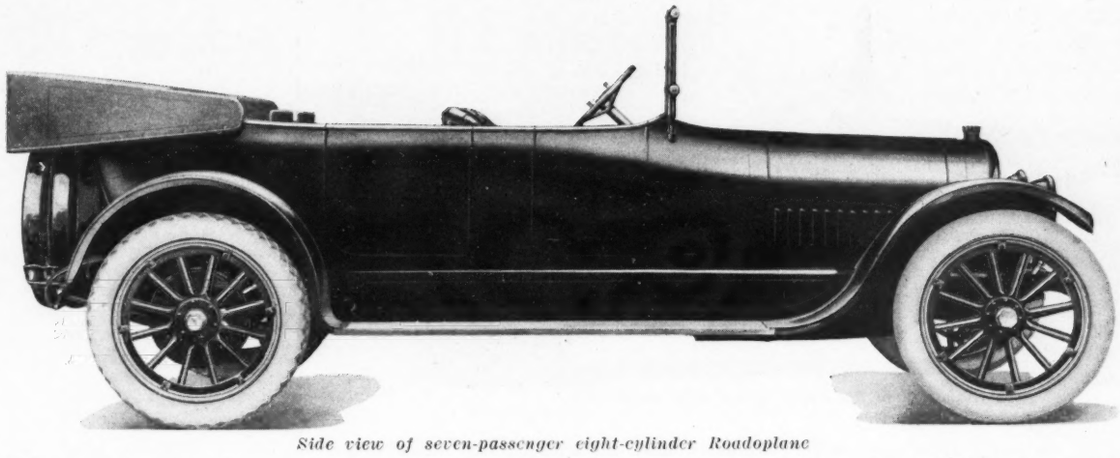
Battery exhaustion quickly results from over-use of the starting motor; cranking the engine for long periods when it refuses to start. When it will not take up its own operation after a reasonable number of revolutions by the starting motor, it is very foolish to continue to drain the battery when it is evident that something is the matter to prevent the engine from starting. It is just like continually turning the starting crank by hand when you know that there is some defect to prevent firing.

Conserve the current as much as possible by judicious use of the lights. When driving, it is unnecessary to have both the headlamps and the sidelamps on. If in the country, only the headlights are needed, and the sidelamps should be off. If on city streets, the city front lights should be used, saving current that would have to be sent the headlights. You often encounter a car standing at the curb for a long period with the headlights on; when all that are necessary are the auxiliary front lights.

The same thing that would cause open circuits with the engine running might result in improper lighting or no lighting when it is not operating also.

Roadoplane, Appersons' Offering for 1917

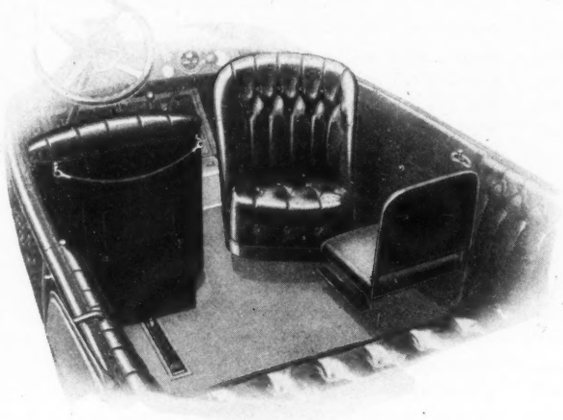
Quieter and More Powerful Motors in New Models of Six and Eight Cylinders



Side view of seven-passenger eight-cylinder Roadoplane

THE secret is out. The Apperson Bros. Automobile Co., Kokomo, Ind., announces two new chassis known as Apperson Roadoplanes which are somewhat different from anything this company has previously offered. The 1917 models include a six with 3½ by 5-inch motor and an eight with cylinder dimensions of 3⅛ by 5 inches.

The motor sizes used in both models follow the practice of 1916 cars as do the general principles of design, but mechanical refinements throughout make a much quieter and more powerful motor, according to the makers. The new eight sells for $150 more than its predecessor, and the six at $200 more than the one with the same motor size of 1916 models. Dryplate disk clutches surplant the contracting band clutches previously used.



Swivel and auxiliary seats in the seven-passenger bodies

The new six motor is in block L-head type claimed to develop 48 horsepower. Light weight with maximum strength characterizes the construction. The crankshafts are hollow and the central portion takes care of oiling the wrist pin and connecting rod bearings from a positive pressure feed system of lubrication. A dual system of ignition, distributor and storage battery and a two-unit, six-volt starting and lighting system, all of new design, constitutes the electrical equipment. A tubular shaft is used between two universals, all of which drives between a three-speed gearset and a demountable floating type of rear axle.

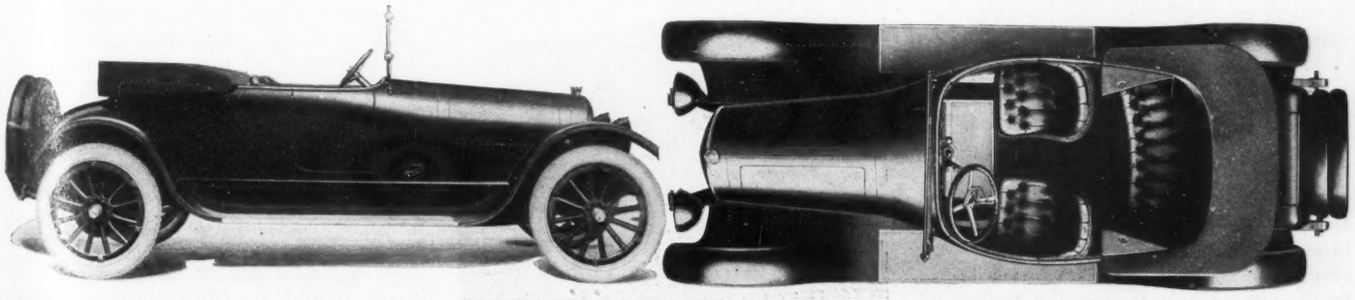
The light eight motor is constructed in blocks of four with L-head cylinder and the motor is the only material difference from the chassis construction in the new six. Springs on both models are semi-elliptic in the front and three-quarter elliptic in the rear. Both the six and the eight touring cars weigh 3,100 pounds and the roadsters 3,050 pounds.

The design, finish and equipment of the bodies are luxurious and thoroughly well planned. Upholstery is of genuine Turkish type leather, the backs being made from a single hide. Even the backs of the seats themselves are covered with genuine leather.

Particular stress is laid on the new chummy car which is similar in the seating arrangement to the four-passenger roadster of the 1916 Apperson model in which the Apperson Bros. claim to have been the first to introduce this type of body. The unusually commodious space in the rear seating compartment, the straight line hood sloping to a gracefully designed radiator, blending into the contour of the rounded sides of the body create an assembly which is more handsome in appearance than anything previously offered.

The bodies are painted in mouse gray or Apperson's special green or blue with metal parts black or nickel, according to the individual taste of the customer. Both chassis are offered in 7-passenger touring cars and four-passenger roadsters. The sixes selling at $1,750 and the eights at $2,000.

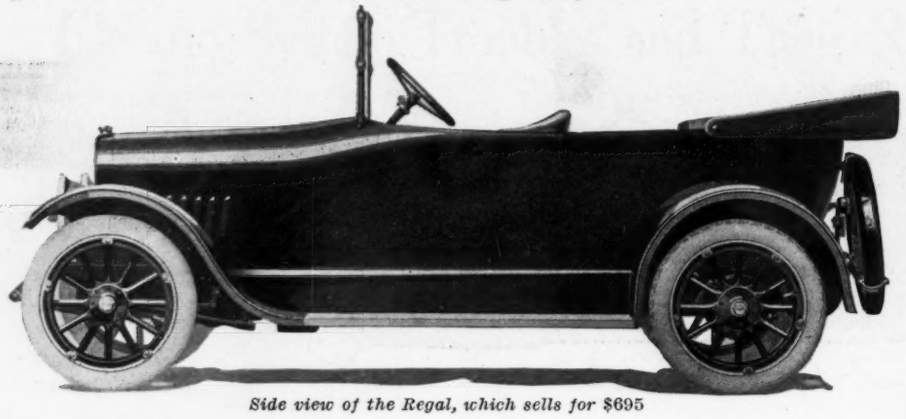
Thirty-four by 4-inch tires front and rear are standard equipment on the six, while the eight uses 34 by 4 in the front and 35 by 5½ non-skid in the rear. The complete equipment includes a mechanical tire pump.



The four-passenger Roadoplane roadster is thoroughly roomy and equipped with every convenience for touring or city use

New Regal Four Best Company Has Ever Offered

At $695 This Car Offers Much for the Discriminating Buyer



Side view of the Regal, which sells for $695

DIFFERING radically from any model previously produced by the Regal Motor Car Co., Detroit, the new Regal 4-Thirty-two enters the field of moderate-priced cars well equipped to give a good account of itself. Marked attention has been paid to refinements and little mechanical details, which, though small in themselves, add greatly to the general performance and satisfaction a car gives.

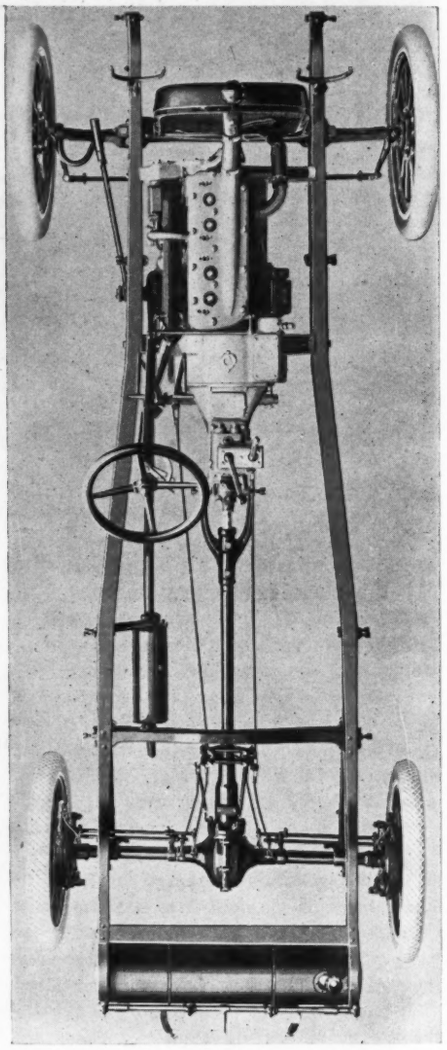
The new model is priced at $695, and is easily the best machine Regal has ever offered at the figure. It comes to succeed both of the four-cylinder models that were offered last year, although the eight will be continued substantially without change. Nearly all the parts are especially designed by the Regal engineering department, and most of them are manufactured entirely in the concern's shops, so that the new model may be regarded as practically a manufactured product throughout.

Its engine is entirely new, the frame is of tapered form instead of being straight as in previous cars, the gearset is in unit with the engine, a new starting and lighting system of Heinze make is fitted, the drive is all changed, a better rear axle has been adopted, the gasoline tank has been removed from the cowl and placed at the rear, and a new body and hood of tapered form have been fitted. With all these differences over previous construction, the new Regal is therefore not a refined edition of any previous model, but may be regarded as a brand new car from stem to stern.

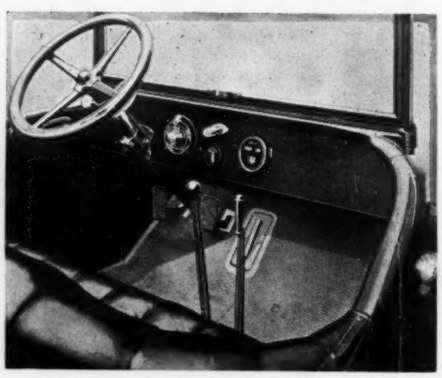
Thirty-two horsepower is normally obtained from the new motor, which is designed to operate at higher average speed than previous power-plants, in accordance with engineering dictates of the day. It has a bore of 3½ inches and a stroke of 4¾ inches, giving a displacement of 183 cubic inches, and a N. A. C. C. rating of 19.6 horsepower. A rigid engine is obtained by casting the upper half of the crankcase in unit with the cylinder block, this construction calling for a detachable head so as to make it easy to get at the interior for adjustment or repair. By making the cylinders and that part of the crankcase carrying the bearing of the crank- and camshafts in one piece, it is possible to secure correct alignment of all the cylinders and the bearings, a feature which does its part in the securing of a smooth-running motor.

Valves are on the left, and by a judicious placing of the exhaust manifold, carbureter and generator, which are the main units on this side, it is no trouble to get to the valve adjustments after having removed the covers that enclose them. In connection with the valve adjustment a refinement is noted that is bound to be appreciated by the man who has to take up the valves. The tappets are secured in their holders in such a way by means of a pin that they cannot revolve, but simply have up-and-down movement. Thus when a valve must be adjusted, it is not necessary to hold the tappet portion with one wrench while turning the adjusting nut with another wrench. Only the tool necessary to turn the one nut is needed, and after the right clearance has been secured, a lock nut sets it. The tappet assembly for two cylinders is removable from the top as a unit.

Special mention should be made of the unusually long pistons that are used. These are made of cast-iron but the section is very light and well proportioned so that there is no excess weight. They measure 4½ inches from top to bottom, affording a long bearing surface that distributes and reduces wear and also practically eliminates any chance of slap. Three eccentric rings are fitted, and there are oil grooves at the bottom of the skirt to carry the oil down, besides a chamfer below the last ring slot, this being provided with a number of oil holes to return any excess lubricant to the crankcase. Thus, practically every possible precaution has been taken against oil getting into the combustion chambers to smoke and carbonize. The piston pins are also quite large—¾ inch diameter—and are secured to their pistons by tapered dowel screws.



Showing chassis layout of the Regal



How the dash equipment is mounted

The rotating members are of ample proportions, the crankshaft being 1⅝ inches in diameter and having three die-cast babbitt bearings that are 2⅝, 2¼ and 3¼ inches long, front to rear, respectively. The flywheel bolts in place by a flange of large diameter, and the camshaft and generator shafts are driven from the main-shaft by helically-cut gears, the crank-

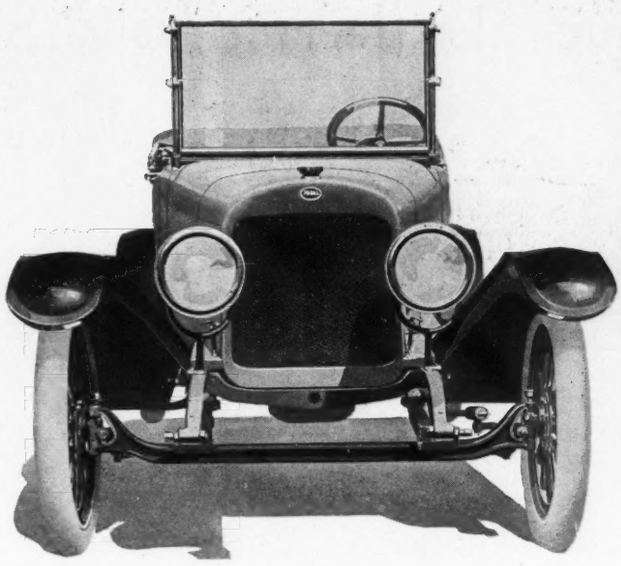
shaft gear being steel and the other two cast-iron for reasons of silence, since steel runs quieter against cast-iron. These are in a separate case from the crankcase and enclosed by a pressed-steel cover.

Special attention seems to have been given the oiling system in this new motor, for it possesses several commendable refinements in addition to the special provision in the pistons against leakage into the combustion chambers. A plunger oil pump, operated from the camshaft, draws the oil from the pressed-steel oil pan at the bottom of the engine, and after it has been strained, it is led to the splash trough in the usual way. A special lead runs to the point of mesh of the camshaft gear with the generator gear, but to insure oil also getting to the mesh point of the camshaft and crankshaft gears without undue complication, a simple and effective scheme was hit upon. A little baffle plate was placed on the inner side of the enclosing case, and the oil, when thrown off by the camshaft gear, strikes this baffle and is directed straight onto the mesh point desired. Breathing is obtained through space provided around the tappet assemblies, and a large filler and oil gauge are placed on the right side of the crankcase.

Clean Motor Design

One thing that has been especially looked to in the design of this motor is clear valve passages. These have been made as direct as possible, and with a single opening in the side of the casting to which the Carter carbureter attaches, the passages lead by the shortest paths to the valve chambers, the valves themselves being of large diameter for an engine of this size. Around them plenty of water space has been provided by so designing the cored places that there is no possibility of these being obstructed in the casting.

The new Heinze electrical apparatus has been compactly and efficiently applied to this motor, the combined magneto and generator being located forward on the left, and the starting motor adjacent to the flywheel on the right, to which it connects through the automatically-operated Bendix drive. This cranks the engine at about 175 revolutions per minute, which is proof of its sturdiness. A pilot arrangement insures proper realignment and resetting of both these units, if they have to be removed for any reason. The coil and regulating switch are mounted on the back of the dash, and the electric system operates in conjunction with a 6-volt, 80-ampere-hour storage battery.



Front view of the Regal

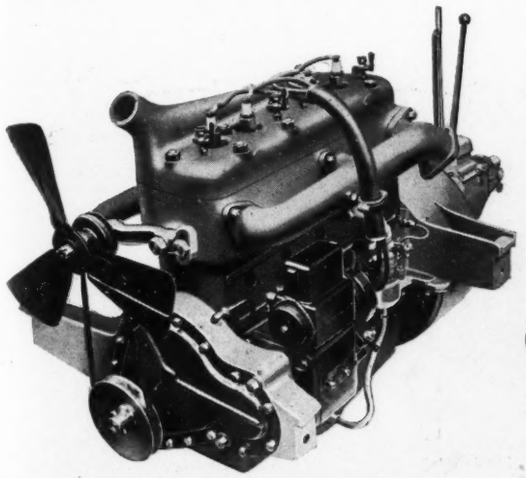
Passing to a consideration of the new clutch used, this is of cone type, having a pressed-steel cone and a self-aligning thrust ball-bearing to take the thrust of the clutch spring. The spring adjustment is obtained by nuts back of this bearing, threaded to the shaft, the inner nut forming the shoulder against which the thrust bearing acts. This makes a simple construction that is easy to take care of. Another thrust bearing back of the spring takes the load imposed when the clutch is thrown out of engagement, and this is also very simply mounted, with a grease cup provided for lubrication. Gears and shafts in the gearset, the case of which bolts to the flywheel housing, are constructed of nickel-steel, and the mainshaft runs on ball bearings, with plain bearings for the jackshaft. To make removal of the gearbox a comparatively simple matter, the clutch throwout lever has been designed to swing down forward enough to allow the front part of the housing to clear.

Continuing back, the drive passes through a specially-designed universal that is of rugged construction made with yokes forged on the ends of the shafts, these yokes at right angles and having machined pins that fit into the two halves of a steel ring. To take it apart, the steel ring halves are only unbolted.

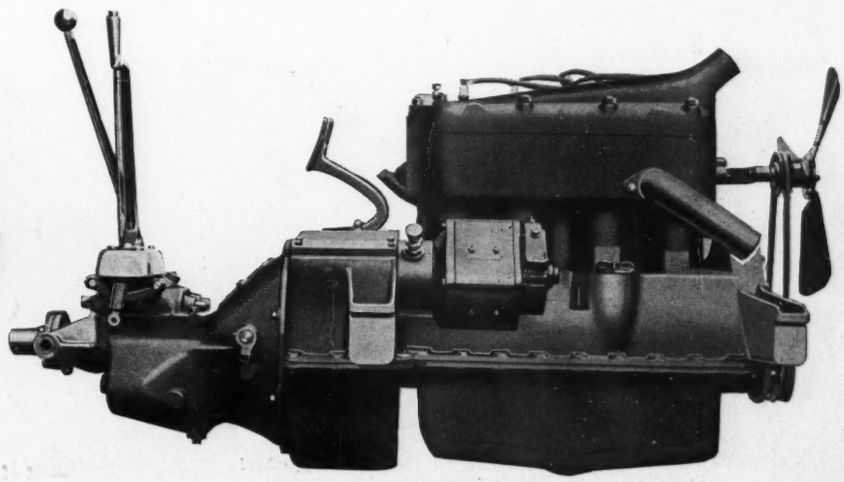
A torsion tube encloses the drive shaft, hinging to a bracket on the rear of the gearcase by means of a yoke, the arms of which are designed to be strong, yet are of sufficient flexibility to take care of any strains that may be momentarily imposed upon them. The axle is three-quarter floating, and uses Hyatts and New Departure bearings. Spiral-bevel gears are fitted, and afford a ratio of 4¼ to 1.

The Body

Five passengers are afforded comfortable accommodations in the body, which is given a straight slope from radiator all the way back, this being the prevailing body fashion. The radiator sets the appearance off well by its sloping line, and being a pressing free from the core, is given a high enamel finish. A special point has been made of the fender fitting to see that the fenders center the wheels as nearly as possible—a thing small in itself but large in its possibilities of increasing appearance. The doors fit snugly and have no mouldings at the top; the instrument board is a hardwood panel and running boards are linoleum-covered. The wheelbase is 108 inches.



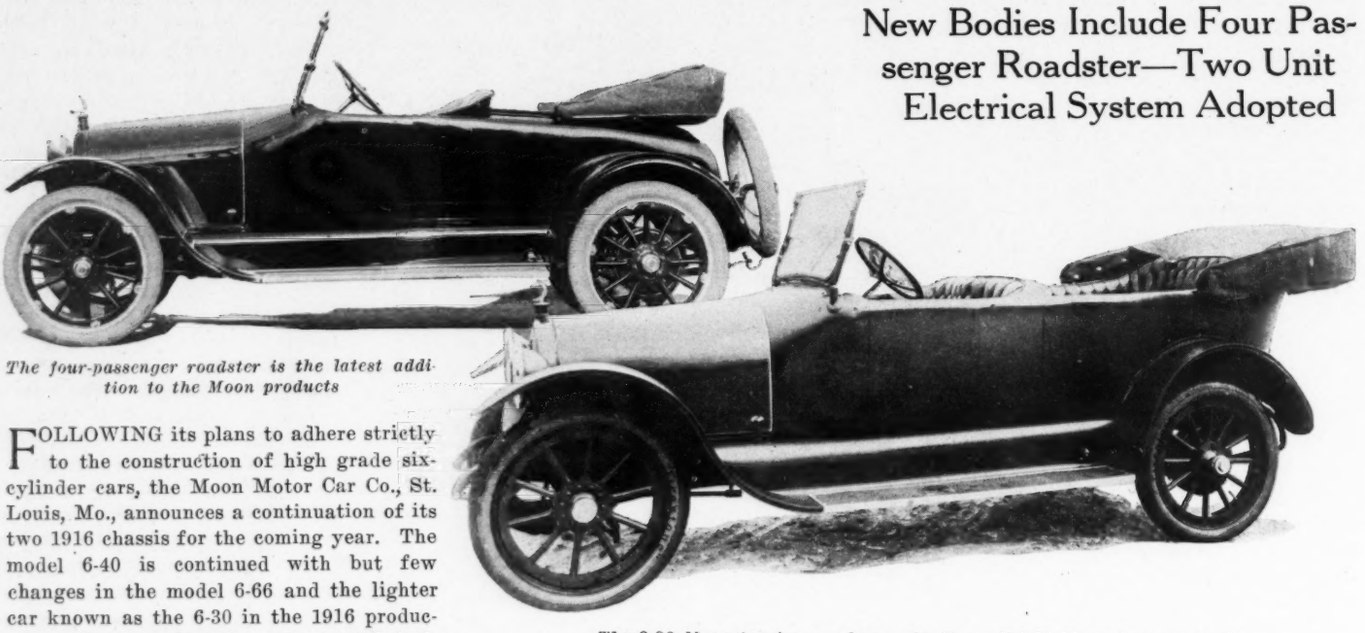
Front end view of Regal motor



Side view of power plant, showing starting motor and gearset

Moon Continues Little and Big Sixes for 1917

New Bodies Include Four Passenger Roadster—Two Unit Electrical System Adopted



The four-passenger roadster is the latest addition to the Moon products

The 6-66 Moon touring car has a slanting windshield on tonneau cowl

FOLLOWING its plans to adhere strictly to the construction of high grade six-cylinder cars, the Moon Motor Car Co., St. Louis, Mo., announces a continuation of its two 1916 chassis for the coming year. The model 6-40 is continued with but few changes in the model 6-66 and the lighter car known as the 6-30 in the 1916 production will be continued as the model 6-43. The price of each has been increased. The larger car which was listed in 1916 cars at $1,475 now sells for $100 more and the small six has been increased in price from $1,195 to $1,250.

Two-Unit Electrical System

The most noticeable change in both chassis is in the electrical system, a two-unit outfit being used in place of the single starting and generator equipment of the 1916 models. The new Delco-Moon two-unit system embodies an automatic spark advance and a new switch with an ammeter in connection.

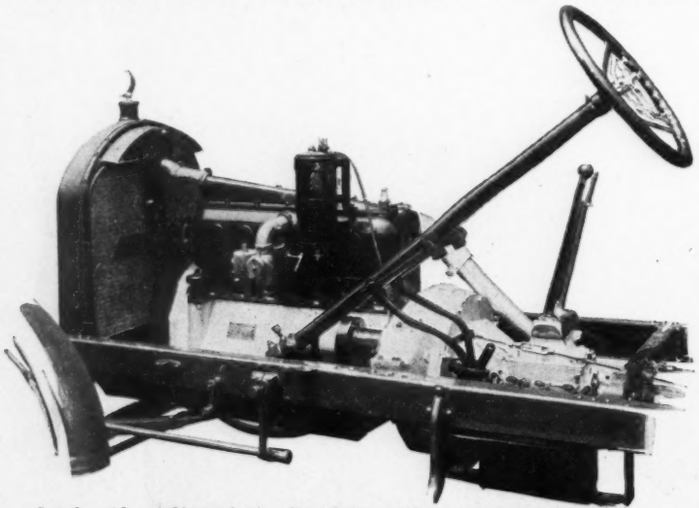
The bodies have also been refined and the 6-66 touring now has the tonneau cowl. The tops of the bodies have been tumbled in creating a marked stream line effect. Acting upon the great demand for four-passenger roadsters, the larger six is offered with an unusually attractive body of this type at the same price as the touring. A light six can be had in a three passenger roadster at the same price as the 5-passenger touring car.

Both models are mechanically similar, the difference being mostly in the size of the parts. Continental motors are used of 3½ by 5¼ and 3¼ by 4½ cylinder dimensions, fitted with Delco cranking, lighting and ignition units and the Stewart Vacuum feed system. The clutch is disk in unit with the motor, and the gearset a three-speed and drive by hollow shaft to a floating axle. Timken axles are used, front and rear.

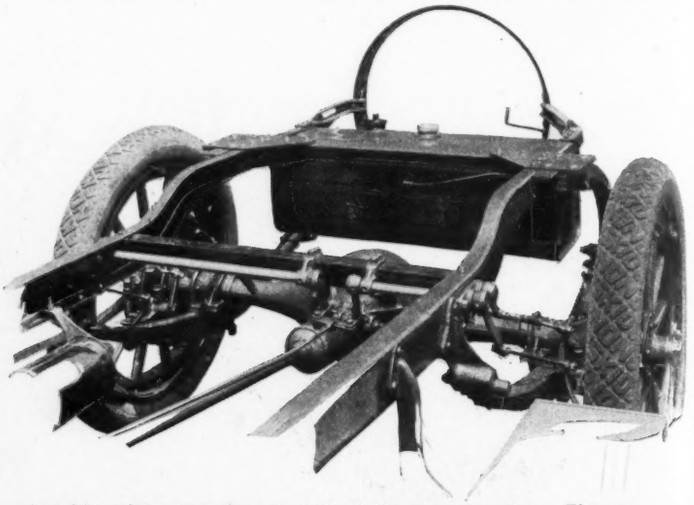
The adoption of the double unit Delco system is accompanied by the use of a Bendix system of drive on the starting motor which is now bolted to the left side of the crankcase. The generator is still located on the right side of the motor and is driven from the water pump shaft. On the right side also is the exhaust manifold which has attached a flexible tube, instead of the nonflexible type commonly used for carrying off gases. The oiling system in both motors is the same combination splash and force-feed as used in other large Continental power plants.

The drive from the motor is conducted to the rear axle through the Hotchkiss principle, double universals and a floating axle being used. Moon engineers have carefully worked out the frame design to take care of the Hotchkiss drive, at the same time embodying a deep strangle in front to enable a short turning radius and a rear extension to form an integral support for the gasoline tank and tire irons.

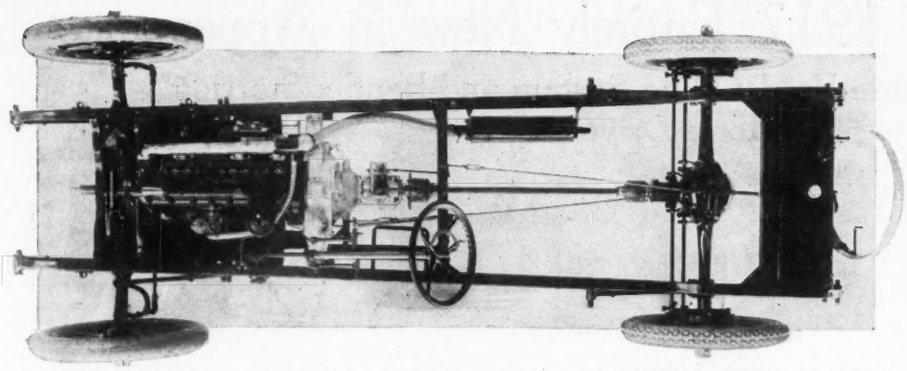
Although accessibility has been a big factor in the design of the chassis throughout the same careful attention has been given the design of the bodies and the kind and location of the equipment. The touring car tonneaus are unusually large with wide tonneau doors and concealed



Intake side of Moon 6-43. The Delco starter turns the flywheel through a Bendix drive



Hotchkiss drive is a characteristic of Moon construction. The gas tank supports are integral with the frame



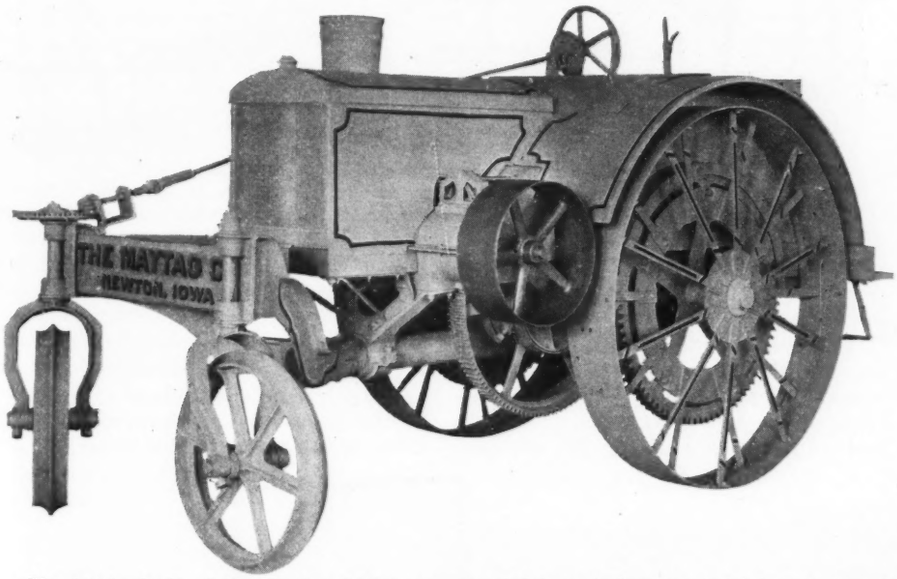
Chassis of the Moon 6-66. There is a noticeable absence of parts between the gearset and rear axle which has long characterized the design of this car

hinges and locks. Both front doors open wide, permitting the driver to enter from either side. Upholstery is done in genuine leather, stuffed with curled hair. A slanting windshield has been incorporated to add to the speedy lines of the cars and a Stewart tire pump and speedometer driven from a gear which constitutes the flange on the front universal, are standard equipment on both the small and bix sixes.

Tire sizes have been increased in the big six. The 6-66 is equipped with 35 by 4½ in place of 34 by 4 tires and the 6-43 carries 34 by 4 the same as last year. The wheelbase of the larger car is 125 inches and of the 6-43 118 inches and the respective weights of the two models are 2,950 and 2,650 pounds.

Maytag Introduces a Tractor

Will Turn In Its Own Length



The front wheels of the Maytag tractor are mounted in swivel castor forks free to turn in any direction. By locking one of the rear wheels the tractor can be turned around in its own length

ABUNDANCE of power for every condition, ease in operation, short turning radius, and accessibility have shared equally in the design of the new $975 all-service tractor announced by the Maytag Company, Newton, Ia. Maximum efficiency per pound of weight without weakening of parts has been the guiding star of the engineers who created the new machine.

The motor is a Waukesha, four-cylinder, 4¼ by 5¾, which develops 29 brake horsepower at the maximum speed of 900 revolutions per minute, according to the makers. Drive is conducted to the rear wheel through a chain of gears to a spur gear operating from a clutch on the motor crankshaft, meshing with a gear of large diameter on the wheel hub, allowing road speeds of from 2¼ to 3 miles per hour.

Ignition is by high tension magneto with batteries for starting and the fuel recommended for the most satisfactory service is a combination of gasoline and kerosene. The driving wheels are 66 inches in diameter with a face of 10 inches and the wheelbase is 96 inches.

The front wheels are mounted in swivel castor forks free to turn in any direction, and free to swing up and down independently of the position of the rear end of the tractor. This permits a steering wheel arrangement so that the direction of travel may be controlled with the wheel in the usual way, and another system of steering controlled by two levers acting on differential gears to make sharp turns to the left or right or in turning the end of a furrow. By applying one or the other of the levers one of the rear wheels is held stationary while the power applied to the free wheel drives the machine around in a circle corresponding to its overall length.

Believing that a frame put together with bolts and rivets will not stand the strain to which a tractor is subjected, Maytag uses a one-piece, semi-steel casting. The shafting, gear box and other working parts are mounted in the same substantial frame on which the motor sets.

The bull gears and pinions are arranged so that the outer rings carrying the gear teeth may be easily removed from their positions, if necessary, at any time and replaced with new ones.

CLOVERLEAF ROADSTER FOR VELIE

Moline, Ill., June 19—The Velie Motor Vehicle Co. has announced for 1917 its Model 22, a cloverleaf roadster, seating four, at $1,065. The chassis remains the same as the 1916 model, the only changes being in the body.

This roadster has unusually large space for luggage aside from the space in rear and under the seats. There is a compartment back of the front seats with doors opening from the inside; these doors are padded on the top and act as an arm rest.

A 40 hp. Continental motor is used. Other features include: multiple dry disc clutch, automatic ignition, Hotchkiss type drive, special gears in rear axle, 50-in. underslung rear springs, Stewart vacuum feed, two-unit Remy electric system, deep tufted upholstery, double bulb headlights, 15-gal. gasoline tank with gage, one-man top, 32¼-in. tires, non skids rear.

The top is made to fold down closely around the outside of the backs of the rear seat and the dust cover, when in position, is closed over the two rear seats, making them invisible. This arrangement gives the car the appearance of a two-passenger roadster with an ordinary top cover on.

EMERSON MARKETED AT $395

New York City, June 19—The Emerson Motors Co., recently incorporated with offices in this city at 1328 Broadway, announces a five-passenger four-cylinder car selling at $395.

The specifications include a 3¾ by 4-in. block motor; thermo-syphon cooling; selective type of transmission with three speeds forward and one reverse in unit with the motor; multiple-disk clutch; floating rear axle; 30 by 3-in. front tires and 31 by 3½-in. rear; 110-in. wheelbase; streamline body and 10-gal. gasoline tank.

Dorris IB-Six for 1917 Entirely New in Appearance

Motor Has Pressure-Feed Oiling System and Bendix Starting Motor Drive

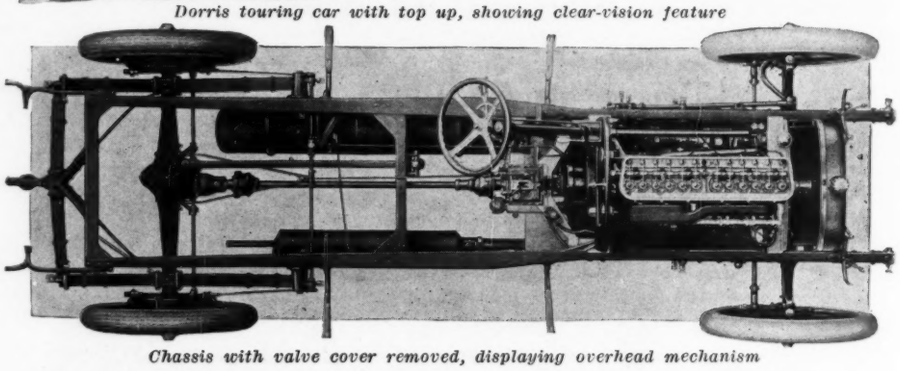
THE Dorris model IB-Six for 1917 is an entirely new car in looks, having a new body of better lines and a radiator which is a distinct departure from the former type. The mechanical changes are few, in fact no radical alterations have been made except in the oiling system which is now the force feed type. The price of $2,475 remains unchanged.

The fundamental construction of the Dorris car has not been changed in 11 years. Features of the design which have weathered the tests of time and are even at this date most up-to-date practice are: valve-in-the-head motor with valves actuating from one camshaft, unit power plant, multiple-disk clutch, Timken axles, platform springs, and 22-inch fan flywheel.

The 4 by 5 six motor was introduced last year with practically the same element of design as characterized the four. The new oiling system for the 1917 model takes care of all motor bearings and the overhead rocker arm bearings from the pressure pump. Oil is forced to the wrist pin bearings through a copper tube embodied in the crankshaft drop forging. The breather tube opens into the enclosed overhead valve compartment, utilizing what oil vapor is given off for a valve lubricant. Of course this is only an added source of oil supply as the rocker arms are hollow and oiled direct from the pressure pump.

An added feature in the oiling system which, although a very small item, is of unusual value to the car owner, is the petcock drain, in place of the usual pipe plug. This drain cock is easy to reach and permits the owner to drain his crankcase regularly without inconvenience. Dorris lays particular stress on the value of cleaning out the crankcase, because of the poor grades of oil and gasoline now to be obtained on the market.

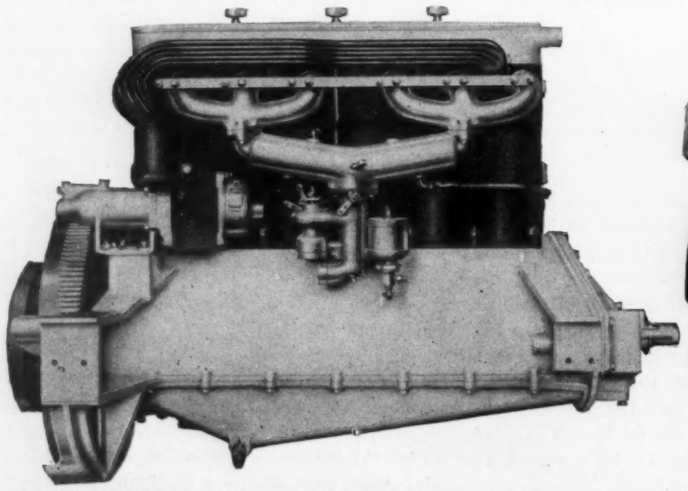
Dorris touring car with top up, showing clear-vision feature



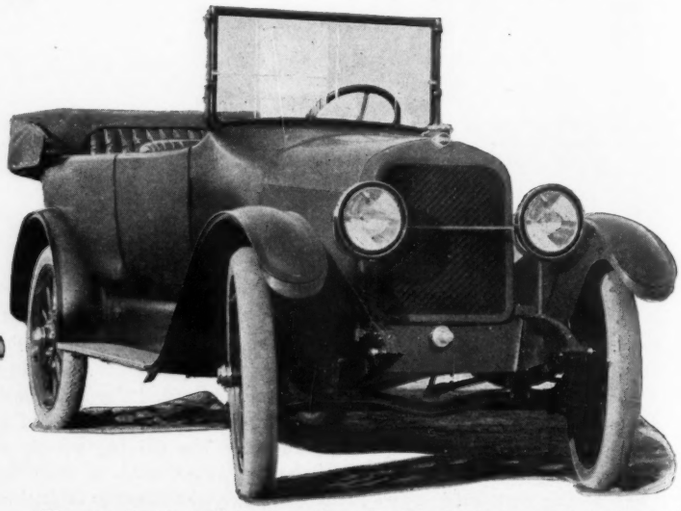
Chassis with valve cover removed, displaying overhead mechanism

The new body is of striking originality. The radiator is patterned after that used on the Peugeot racing machines. Both the front and the back seats will comfortably carry three people, extra seats provide for two more passengers. Body refinements are noticeable throughout. As another step towards simplicity and accessibility an aluminum dash is fitted which is made a part of the chassis itself. All electrical wiring is carried on this dash and none of the fittings have to be disturbed when occasion demands that the body be removed.

The one-man top has been redesigned with a view of creating a conformity between the body lines and the top itself with striking results. Although the height of the top is sufficient to give clear vision to the occupants of both seats and allow entry with but very little stooping, the de-



Intake side of Dorris motor. The new Bendix drive housing is a part of the bracket which supports the starting motor



The new Dorris radiator is patterned after the design used on Peugeot racing cars

sign has been so worked out that the extra height is not noticeable.

The Dorris idea of perfecting every item, no matter how small, is evident in the construction of the side curtains. Irons are provided which fit to the back of each door attached by the aid of thumb screws. The curtains fasten solid to the top and body on one end and slide over these irons on the other, making an assembly which permits opening and closing the doors without unfastening the curtains. A flap is provided over the rear window of the top which can be let down during night driving when the glare of street lights throws a reflection through the rear windows onto the windshield, hindering the vision of the driver.

Chassis Characteristics

Although the Dorris chassis design has been refined rather than changed for a number of years a resume of the principal characteristics will show how thoroughly modern each unit is. The crankshaft is suspended on seven bearings, eliminating any possibility of a sprung crankshaft or a vibrating crankshaft. The camshaft is carried on the same number of bearings, and according to the factory, this construction is invaluable in a large six to maintain rigid cams and thus establish perfact timing under any conditions.

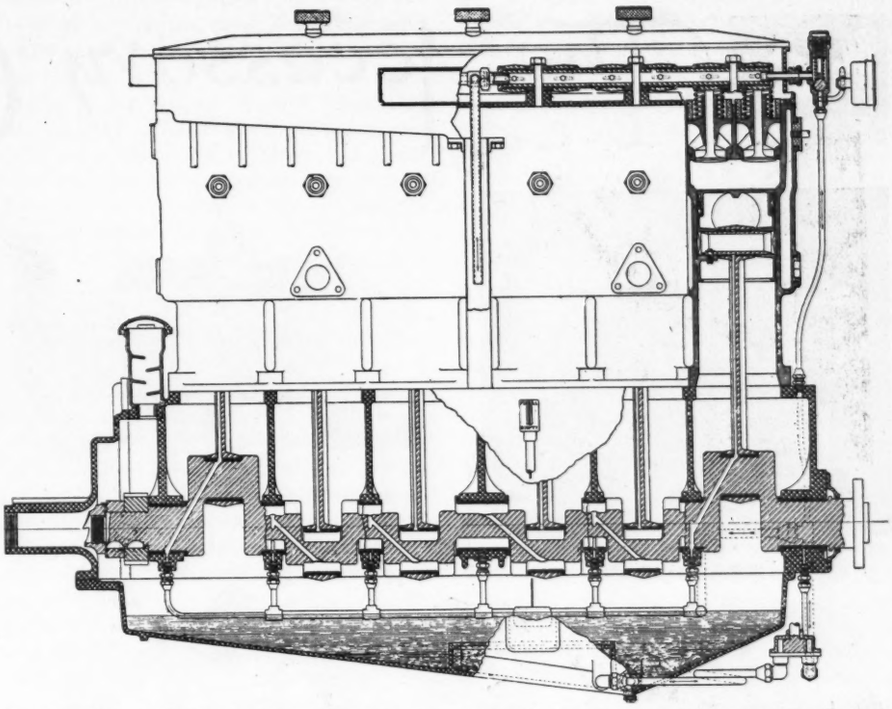
The valves are each set in a cage which is readily removable with the aid of a wrench. The valve lifting feature has received unusual attention. The push rods, which float between springs on the upper and lower end, actuate off of the cam shaft by the means of rollers. The assembly which contains the rollers is kept from revolving by the aid of steel pins sliding up and down in slots within a brass shell. Perfect action without noise and maximum reduction of wear is claimed.

Although the power plant is a unit with the motor it is not enclosed in a housing integral with the motor as is usual practice. The reason for this is that the large flywheel contains fan blades which assist in the motor cooling and carry the heat away from the front seat floor boards. To enable the air to circulate from this fan, the gearset is fastened to the motor with arms which are a part of an aluminum casting.

The gear train drive of the starter has been discontinued and the Bendix system is used in its place. The two-unit Westinghouse starting and lighting system and Bosch magneto ignition are continued without material change except in the starter drive as mentioned above.

Dorris has long been an advocate of platform spring suspension. The new car is carried on exceptionally large springs, the rear side members being 50 inches long, 2½ inches wide, with eight leaves; the cross springs, 40 inches long, 2½ inches wide, with eight leaves, and the front 42 inches by 2½ inches, with ten leaves.

For the rear axle a Timken product is again used with spiral bevel drive and 2½-inch wide brakes of large diameter. The torque is taken care of through a drop forged torsion bar suspended between the rear axle and a bracket on the center cross frame member.



Cross section of Dorris motor. The new pressure feed oiling system takes care of the overhead camshaft bearings

A peculiar little detail that seems to make for convenience and better distribution of weight is the use of a pressed steel cylindrical gasoline tank located next to the left side member of the frame. This placing enables a filler and a gasoline gauge to be arranged so that they stand almost flush with the front floor board; the gauge can be seen at any time by glancing downward, and the filler is accessible by merely opening the side door. A Stewart vacuum feed is employed for raising the fuel.

Every part of the car but the body and axles are Dorris built. The gearset retains the feature incorporating a locking device through the means of which the gears cannot possibly be shifted until the clutch is released, and there is no possibility of more than one gear being engaged.

The equipment is complete, including Stewart tire pump, Stewart horn, 36 by 4½-inch tires; the wheelbase is 128 inches.

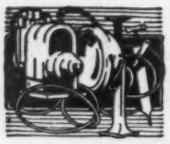
Electric Motor Chair for Boulevards

THE Motor Chair Sales and Operating Co., with offices in the Westminster Building, Chicago, has introduced a new electric pleasure vehicle known as the motor chair, which created comment at the Pacific coast expositions a year ago.

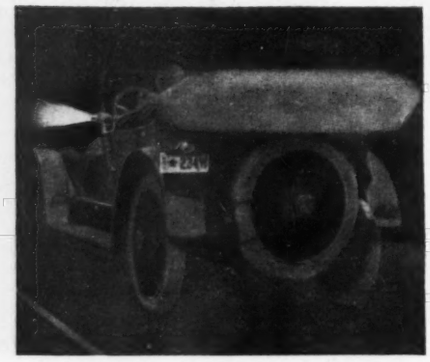
The new car is distinctive both in appearance and usage, as it appears to fill a niche in the motor car world not supplied by other makers. As will be noted the car is built on the lines of the beach chairs that dominate the board walks at Atlantic City and the pathways of Florida winter resorts. The bodies are either metal or oak and rattan and can be built to individual designs.

As the motor chair looks on the street

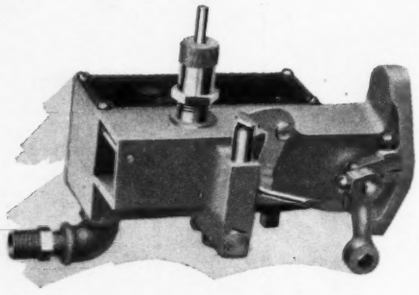
The battery is a standard Exide 12-volt, 150-ampere-hour capacity, and, together with the motor and controller, is mounted on a substantial running gear. The wheels are solid rubber tired and are suspended on ball bearings.



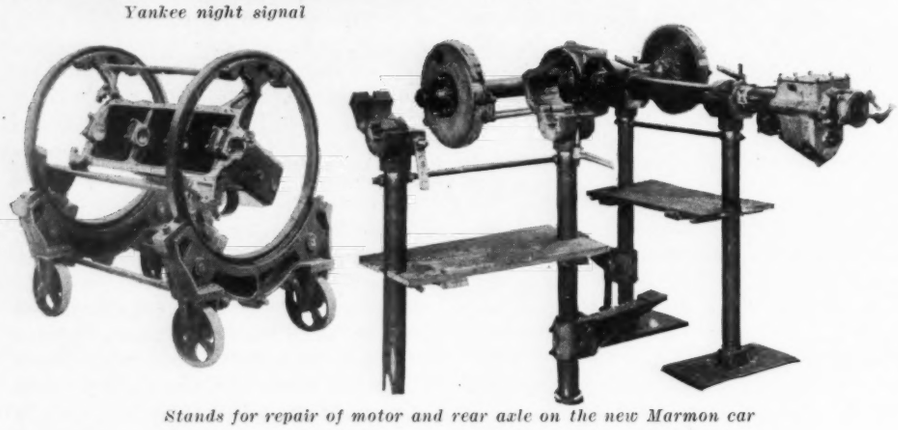
The Accessory Corner



Yankee night signal



The Sunderman carbureter which burns kerosene or gasoline and embodies a motor primer



Stands for repair of motor and rear axle on the new Marmon car

Night Signaling Device

A NEW and unique night signalling device for motor cars has been recently introduced by the Yankee Mfg. Co., Milwaukee, Wis. It consists of a blown flesh-colored celluloid hand which fits over a tubular flashlight equipped with a special reflector for the lamp. The Universal signal allows the same well known method of signalling to be used at night as during the day. The hand may be detached and the flashlight used as a trouble lamp in the garage or on the road. The list price is $2.50.

Marmon Engine Stand

The Nordyke and Marmon Co., Indianapolis, Ind., designed two stands for use throughout the Marmon factory in handling motors and transmissions and these stands have proven so successful that the factory has decided to furnish them to dealers. The engine stand is mounted on four wheels, so that it can be readily moved. The engine can be turned into any position, and completely assembled or disassembled while on the stand. The rear axle stand may be used for all work on this part as it permits the complete building up or tearing down of the rear system. The arm extending from one of the uprights has a spring arrangement by which one side of the housing is placed against the center piece of the rear axle when the other side is mounted above, so that all three pieces of the axle are held in position for the through bolts. The price of the engine stand is $105, and the rear axle stand $45.

Gasoline or Kerosene Carbureter

The Sunderman Corp., Newburgh, N. Y., is out with an improved Sunderman safety carbureter, the alterations from the previous model consisting of the attachment of a plunger pump to the throttle connections which ejects additional gases when the throttle is instantly thrown wide open. This pump also acts as a priming device without additional attachments to the dash board, inasmuch as the foot accelerator is used for priming the motor. Such a device permits a quick get-away so much demanded of the present day high-speed motor, according to the statement of the manufacturers. The principle of feeding pure gas from cold gasoline or kerosene to the motor directly from the carbureter eliminates the need of a hot air or water jacket. The Sunderman carbureter is said to do this by a combination of terrific air force, vacuum and screen. Gasoline dropping from the nozzle is drawn into a vacuum created by the action of the piston, dragged into whirling eddies of air currents and passes through the screen into the motor. It is claimed that actual tests show that nothing passes the screen but a pure explosive vapor even when the motor is cold.

Hand-I-Wash Equipment

The Hand-I-Wash, put out by Tay-Miller Mfg. Co., Philadelphia, Pa., is a combination of water, soap and towel put up in a can about 3 inches in diameter and 1 foot high. By turning the outlet on the top of the can the liquid may be sprinkled on the hands and is used the same as soap and water. The hands are then dried by tearing off a section of the paper towel which is on a roller in the body of the can. Both liquid and towel may be purchased separately so that when the can is empty it may be refilled. The liquid will remove all kinds of dirt, grease and oil, is antiseptic and neutral, containing neither acid or alkali. The price is $1. A refiller consisting of a towel roll and tube of liquid sells at 50 cents.

Paste for Rapid Soldering

The advantage claimed for the use of Burnley Soldering Paste, prepared by the Burnley Battery & Mfg. Co., North East, Pa., is that it spreads the solder evenly and quickly, and that the solder never tins before spreading. It is superior to a liquid flux because it does not run away from the point at which it is applied, and it cannot be spilled. A soldering stick is designed particularly for electrical work. It is rubbed on the heated joint and then the solder is applied in the usual way. It is wrapped in tin foil and will not corrode the wires or affect the insulation.

Badger Gage for Fords

The Badger Crafts Shop, Sheboygan, Wis., makes a gage device which is combined with the filler cap and screws into the opening in the tank. The dial is marked for gallons and registers up to 10. Price, $1.25.

Gasolene Saver

The H_2 O Mfg. Co., Cambridge, Mass., is marketing a gasoline saver in the shape of its H_2O vaporizer. Water vapor is supplied to the intake where it mixes with the charge, increases the power and reduces carbon deposit, it is said. It consists of a tank of water which is strapped securely to the exhaust pipe, the heat from which raises the water to such a temperature that vapor is given off. A pipe connection from the top of the tank carries the vapor to the manifold. The entire equipment lists at $10.

Graphite Lubricator

An instrument which feeds pure flake graphite directly through the cylinders and valves of motor car engines is now being marketed by the Graphite Lubricator Co., 326 Diamond St., Pitts-

burgh, Pa. The Graphite lubricator, which in outward appearance represents a large oil cup is filled with pure motor graphite and screwed into the intake manifold leading to the various cylinders. The slight pulsations of pressure in the manifold actuate a balanced valve in the lubricator, giving an automatic and accurate supply of graphite in each intake and mixture. These fine particles of ghaphite being in the dry form are readily carried to the cylinders and distributed to the various parts of the cylinder and valve surfaces. It is said that the graphite becomes permanently attached to the metal and builds up a coating that results in the highest regree of lubricating efficiency. It costs $6.00 ready to attach.

Specialties for Ford Cars

Muffler cutout sets, wheel pullers and high grade camshaft bearings for use on Ford cars are specialties included in the line of motor car accessories being jobbed to the trade exclusively by the C & E Mfg. Co., Marshalltown, Ia. The cutout set consists of a cutout valve, pedal pulley, spring and chain. The valve is made of high-grade cast iron with close fitting butterfly and a malleable lever. The construction of the wheelpullers are shown in the illustration. They are made of malleable iron, light in weight and small in size and have an adjustable feature on the side which insures a tight fit on the wheel hub threads eliminating possibility of stripping the threads. The bearings are made of high grade gray iron, machined accurately to size and milled lengthwise to allow splitting with a chisel before using. Prices are quoted in lots of 1,000.

New Non-Leaking Rings

No-Leak-O is the name of the piston ring being marketed by the Automobile Accessories Co., Baltimore, Md. This ring is unusual in its type, inasmuch as it is made of one piece. A groove is cut in the ring at right angles with the face and sloping downward for oil sealing. It is the oil sealing feature which is claimed to make the device proof against leaking. On the downward stroke of the piston the square edge of the ring will gather the surplus oil from the cylinder wall and pull it toward the oil pit. On the up stroke the oil is distributed again on the cylinder wall from the sloping face of the groove. List prices range from 50 cents to $1.30, depending on the diameter.

To Pull the Car Out of the Mud

A new device known as the Hubpul is being put on the market by the Pillsbury Mfg. Co., Minneapolis, Minn., which is a combination hub cap wheel puller and a device for pulling the car out of mud holes. It is made exclusively for Ford and model 4-90 Chevrolet cars. The hub pull is quickly attached to each rear wheel of either of the cars above mentioned by simply unscrewing the original hub cap and inserting the device in its place. It may be left on permanently if desired, and as it is neatly designed and nickel-plated does not detract from the car's appearance. The rubber covered special hooks which attach to a rope are hooked around the spoke, the rope wrapped once around the hub, then carried forward or backward from the underside and anchored to a stake, telephone pole, tree, post or any stationary object; the motor is then started and the wheel's slipping causes the cable to be wound, which pulls the car gradually out with much greater leverage than could be obtained with the motor on ordinary traction. The device may also be used for removing wheels from the rear axle without stripping threads. The price per set is $6.00.

Hook On Boot

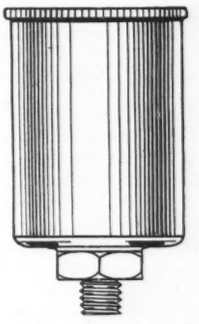
The new tire boot manufactured by the Polsen Rubber Co., Cleveland and Kansas City, may be used as a complete tread, in which case several sections are required for a tire, or it may be employed as a blow-out patch, in which case only one is required. The boot is made of heavy frictioned fabric vulcanized over a tire form to make a perfect fit. The tread is heavy chrome leather, studded with hardened steel studs. It is attached by a set of adjustable steel hooks which fit in the rim. The 3-inch size sells for $1.30, 3½-inch, $1.40; 4-inch, $1.50; 4½-inch, $1.70.

Auxiliary Water Circulator

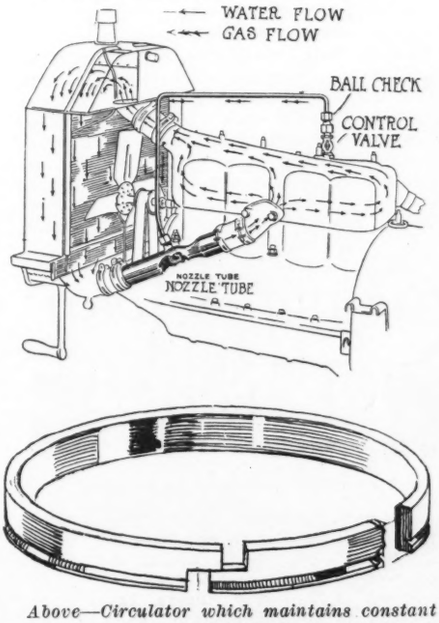
The Perfection circulator is an air-operated ejector, designed to utilize a small portion of the exhaust gas from the motor to operate a device which will give uniform temperature to the motor regardless of the conditions under which it is operated. As will be seen by the illustration, the attachment consists of a specially designed nozzle tube connected with the exhaust manifold through piping which is carried over the motor. The gas is carried into the lower connection between the radiator and the engine. The water at this point is forced forward by the exhaust gas moving in the direction imparted by the jet, which is toward the engine. The water will be forced forward and through the cylinder jackets with a velocity which corresponds to the amount of exhaust gas pressure and consequently the amount of motor labor. It is claimed that with this device installed on a motor, in the winter season or in cold districts the motor can be maintained at the same temperature of high efficiency as in summer by simply removing the fan belt, any tendency to overheat or boil being immediately offset by the increased rate of circulation incident to the generation of heat in the cylinder. The equipment as illustrated sells for $7.50. The circulator is manufactured by the Motor Cooling System Co., Baltimore, Md.

New Gasoline Gauge

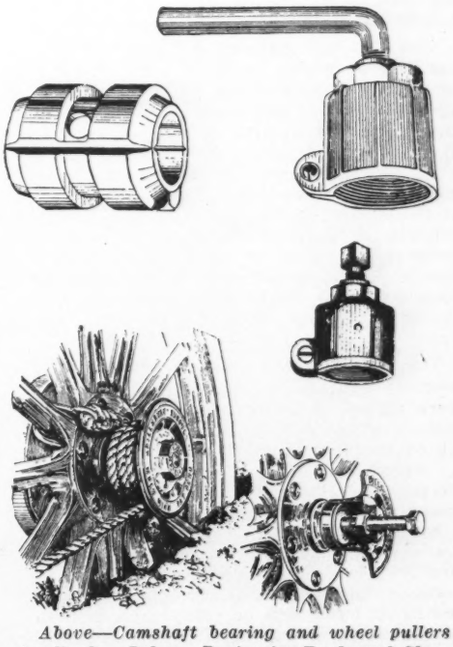
The Badger Crafts Shops, Sheboygan, Wis., have brought out a new type of gasoline gauge, designed especially for Ford cars and made to substitute for the tank filler cap. The indicator is graduated in gallons in etched letters of such size that they are easily legible, even at night. The apparatus consists of a hollow brass float which is fitted to a spiral upright that turns the indicator on the dial as the gasoline supply is raised or diminished.



Instrument to feed pure graphite into the motor cylinders



Above—Circulator which maintains constant water temperature. Below—No-Leak-O piston ring made in one piece



Above—Camshaft bearing and wheel pullers for Fords. Below—Device for Fords and Chevrolets to pull the car out of the mud

From the Four Winds

HEAR YE! HEAR YE! COURT IS IN SESSION—A St. Louis patrol held up an alleged speeder.

"Where do I appear for trial?" asked the driver.

"Before Justice of the Peace Howe at Overland Park," answered the patrol, as he drew a blank bond.

"Never mind that," said the driver. "I am Justice Howe. I convene court here and now and discharge the defendant," and he drove away.

The patrolman visited Howe's court next day to assure himself that he had not been imposed upon, but he did not revive the charge.

A 79-YEAR-OLD Driver—"Grandpa" Medler, better known as Uncle John, a man 79 years of age, drives his Reo car like a veteran and enjoys the thrills of fast travel in the vicinity of Wasco, Ore., as much as any of the younger bloods.

Tires on a Soda Fountain—The first druggist to take advantage of the popularity of motor cars is in Little Rock, Ark. This gentleman has shown remarkable initiative in equipping his soda fountain to represent a popular light car. The car is equipped with United States "Nobby" tread tires and, looking directly at the fountain, one sees the headlights, the steering wheel and the tires.

Cars Cut Into Railway Earnings—The operations of motor vehicles, both as public and private conveyances, has had its effect upon the freight and passenger earnings of the steam and electric railway lines in the state of Washington during the last year. This fact is shown by the report of the state tax commission just filed. The reports of the electric railway companies to the tax commission show a consistent decrease in gross net earnings of almost every electric line in the state and the reduced earnings have caused the roads to refrain from adding to the equipment or adding to their mileage.

Traction Company Adopts Buses—After several months of negotiation, contracts were signed in Joliet last week by which there is to be added to the electric car service of the Joliet and Eastern Traction Co. a motor bus line, connecting Chicago Heights and Hammond and all intermediate towns and cities. Business men subscribed a bonus of $1,700 to help pay the expense of the new service. Two buses, each seating twenty persons, will make alternate trips between Chicago Heights and Hammond, and additional buses will be established as soon as the business warrants. The buses will meet all cars from Joliet during the day. The run between Chicago Heights and Hammond will be about 50 minutes and a fare of 40 cents will be charged. Electric railway promoters appear to have overlooked this territory. The buses serve a population of 6,000 per mile, one of the most important of the Chicago suburbs.

Oregon Has 27,311 Cars—Oregon had a total of 27,311 registered cars June 1, including passenger and commercial vehicles. The five leading makes are: Ford, 10,263; Studebaker, 2,423; Buick, 1,904; Overland, 1,992, and Cadillac, 965. The total amount of new business for the current year totals 5,421.

Street Railway Company Uses Buses—The Galesburg, Ill., street railway company is planning to utilize motor buses in connection with their branch lines for the purpose of serving communities not extensive enough to warrant the extension of the line and daily operation of cars. Residents of Nelsontown, a suburb, have been seeking street railway facilities for several years, but the company has maintained that a line to that district would not be profitable. Another line of buses is proposed to connect the north end of the Broad street car line with the Lincoln city park. A number of the motor vehicles will be installed for experimental purposes and, if enough additional business is created to pay for the upkeep, the service will be made permanent, and also extended to other sections where similar conditions prevail.

Coming Motor Events

TRACTOR DEMONSTRATIONS

July 17-21—Dallas Tex.
July 24-28—Hutchinson, Kan.
July 31-Aug. 4—St. Louis, Mo.
Aug. 7-11—Fremont, Neb.
Aug. 14-18—Cedar Rapids, Ia.
Aug. 21-25—Bloomington, Ill.
Aug. 28-Sept. 1—Indianapolis, Ind.
Sept 4-8—Madison, Wis.

Jitneys Cut Into Traction Profits—According to Oregon Public Utilities Commission, the Portland Railway Light & Power Co., Portland, Ore., have been losing money heavily, due, it is stated, to jitney competition.

Minnesota Registrations 108,286—For May Secretary of State J. S. Schmahl turned into the Minnesota treasury $11,902, covering licenses at $1.50 each. The office issued 6,900, at times at the rate of 500 a day. The total for the year is 108,286 cars.

Pedestrians' Rights Same as Motorists—A pedestrian's right on highways has been held equal to that of a motorist. Judge G. D. Reynolds, in the St. Louis court of appeals, St. Louis, Mo., in his decision has so ruled, stating that pedestrians have the same rights in the public highways as persons driving in vehicles drawn by horses or propelled by other power.

Dallas Tractor Demonstration July 18-21—Plans for the tractor demonstration near Dallas, Tex., July 18 to 21, are practically complete. Indications are that the machinery will represent investments of at least $1,000,000. It will include 200 tractors and possibly fifty plows. Forty-nine exhibitors already have made applications for spaces in the big tent where the display of machinery will be had.

Oregon Car Run 130,000 Miles—One of the first ten cars in the state of Oregon is still working and enjoying its ripe old age on the roads of eastern Oregon. It is an Oldsmobile one-cylinder and is owned by E. H. Hall, Heppner, Ore.

Good Roads Activities

$12,500 for Hennepin Roads—The Automobile Club, Minneapolis, Minn., has voted to spend $12,500 on roads in Hennepin county in 1916 and $2,500 on signboards. The club has now more than 1,000 of the signboards in use in the county.

Goodrich Signs in Washington—Steel signs marking every crossing in King county, Wash., and setting forth the distances between important points have been furnished by the B. F. Goodrich Co. without cost to the county, and the county will stand the cost of erecting.

Washington County Building Roads—Despite the fact that the county has never had experience in building highways for motor cars, Skamania county, Washington, is building an excellent road with but 5 per cent grade east and west along the Columbia river. A bond issue of $210,000 is being spent this year on 43 miles of highway.

Coast Roads Now Good—For the first time in 1916 it can be said that all coast highways are inviting to automobilists and tourists can now travel anywhere along trunk lines and on many of less frequented roads. Attempts to keep up motor traffic during the rainy weather cut the highways into miserable shape and it has taken some time to get them in condition.

Texas Wants Highway Commission—The next session of the Texas legislature is expected to pass a law creating a state highway commission, in order to receive federal appropriations for good roads. C. D. Smith, of Dallas county, president of the Texas Judges' and Commissioners' Association, has appointed a committee to present resolution in this connection at the next session of the legislature.

Jefferson Highway Headquarters—Headquarters for the Jefferson Highway have been established at Des Moines, Ia., by J. D. Clarkson, Carthage, Mo., general manager of the new road from New Orleans to Winnipeg. He will spend the summer touring the road and pushing construction work. The Chalmers Motor Co. has donated a touring car for the use of the manager. It is fitted up as a traveling office and is the last word in convenience. Mr. Clarkson has secured a donation of 500 carloads of gravel for use on the road. He also has received a donation of enough oil for a sample mile of oiled road.

Would Build All-Year Road—The Automobile Club of Seattle is actively engaged in gathering data relative to the feasibility of constructing a road to extend west from the Pacific highway at Drain, Ore., through the draw in the Coast range to Gardiner, Ore., and thence follow the coast line south to the connection with the California coast road at Crescent City, Cal. According to reports from county authorities through which this road would pass it would not reach an elevation of more than 700 feet at any place, and consequently would be well out of the snow belt all the year round. It would be unique in that it would be the only road in the world constructed between the 33d and 50th parallels of latitude of any great length, which could be used all the year by motor cars.

St. Louis Road Plans Endangered—The $3,000,000 bond project for good roads in the county surrounding St. Louis, Mo., for which county and city motorists have been working so hard, is endangered by what was intended to be a friendly suit to decide some doubtful legal questions concerning the issue, chiefly the denominations of the bonds. The friendly suit was arranged, but now comes Thomas K. Skinker, a wealthy county property owner, and threatens to intervene in an unfriendly way, bringing up the point as to whether municipal residents in the various county towns can be taxed for road improvements that will be made only outside the towns. The county authorities assert they will get busy on the roads without waiting for the decision, which probably will be delayed 3 years. Already the surveys and traffic census have been completed and actual work is planned to begin in September.

Marking Nebraska-Iowa Roads—Three thousand double-ply duck signs will be placed on the highways radiating from Omaha and Council Bluffs by the Omaha Automobile Cliub during the coming season. About 100 of these have already been placed by the club sign car along the Lincoln highway and the Military road out of Omaha. The new duck signs are believed to be the solution of a vexatious problem which has confronted the club from the start of its road-marking. The old wood signs had many objections, chief among which was the proclivity of the average small boy toward knocking them down or splitting them. The duck sign is first oiled and then painted, and is guaranteed to remain in a good state of preservation for at least 3 years. They are also more readily installed.

Clubs and Associations

Peebles Leaves Ohio A. A.—A. J. Peebles has resigned as secretary-treasurer of the Ohio Automobile Association, Columbus, O., and has entered the rubber business. His successor will not be selected for several weeks.

Clubmen to Be Policemen—The Akron Automobile Club, Akron, O., has provided for twenty-five of its members to act as special policemen during Fourth of July celebration. The special policemen will organize by the naming of a captain.

Toledo Body Would Affiliate—A meeting of the Toledo Automobile Dealers' Association, Toledo, O., was held recently, when further steps were taken to affiliate with the Ohio Automobile Association. A complimentary dinner was given to the members of the association.

Carlisle Club Formed—The Carlisle Motor Club, Carlisle, Pa., was organized last week and elected the following officers: President, J. Kelso Green; vice-presidents, Dr. H. A. Spangler, W. K. Jones and Dr. E. L. Lefever; secretary, S. Sharpe Huston; treasurer, J. D. Zimmerman.

Recent Incorporations

Akron, O. — The Miami Rubber Co.; capital stock, $40,000; to manufacture rubber articles; incorporators, E. H. Botsford, George C. Congdon, W. A. Crooks and O. D. Lawrence.

Chesaning, Mich. — Chesaning Garage; capital stock, $30,000.

Cleveland, O. — The Zuerl Auto Fuel & Supply Co.; capital stock, $10,000; to deal in motor car supplies and accessories; incorporators, Fred W. Zuerl, W. W. Norris, J. M. Walker, Joseph N. Ackerman and George S. Myers.

Cleveland, O.—American Auto Sheet Metal Co.; capital stock, $25,000; incorporators, W. J. Mahon, D. Gobeille, W. W. Burk.

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Columbus, O.—C. A. S. Products Co.; capital stock $100,000; to manufacture two-speed gears; incorporators, C. D. Cutting, C. S. Krumm, J. W. Graham, A. W. Tyler and Dorthy Loachler.

Columbus, O.—Phelps Mfg. Co.; to make wire wheels; capital stock, $100,000; incorporators, H. C. Phelps, Dr. C. K. Wissinger, L. M. Reif, T. W. Pickard.

Corliss, Wis.—The Corliss Motor Truck Co.; to manufacture and deal in motor trucks, etc.; capital stock, $100,000; incorporators, A. K. Stebbins, A. C. Moeller and C. Rodermund.

Fond du Lac, Wis.—The Fond du Lac County Automobile Club; no capital stock; incorporators, Lawrence McIntyre, N. A. MacDonald and E. MacIntyre.

Harlan, Ky.—Harlan Motor Car Co.; capital stock, $6,000; incorporators, W. W. Lewis, C. E. Bell and J. W. Farmer.

Milwaukee, Wis. — The Bellevue Garage Co.; to operate a garage, repairshop, agency, etc.; capital stock, $50,000; incorporators, Richard F. Mofiros, Carl Lueders, Sr., and E. D. Mokros.

Montreal, Can.—Girdwood Lamb Motors Ltd.; capital stock, $500,000; incorporators, Mr. R. F. Girdwood, Mr. Lamb.

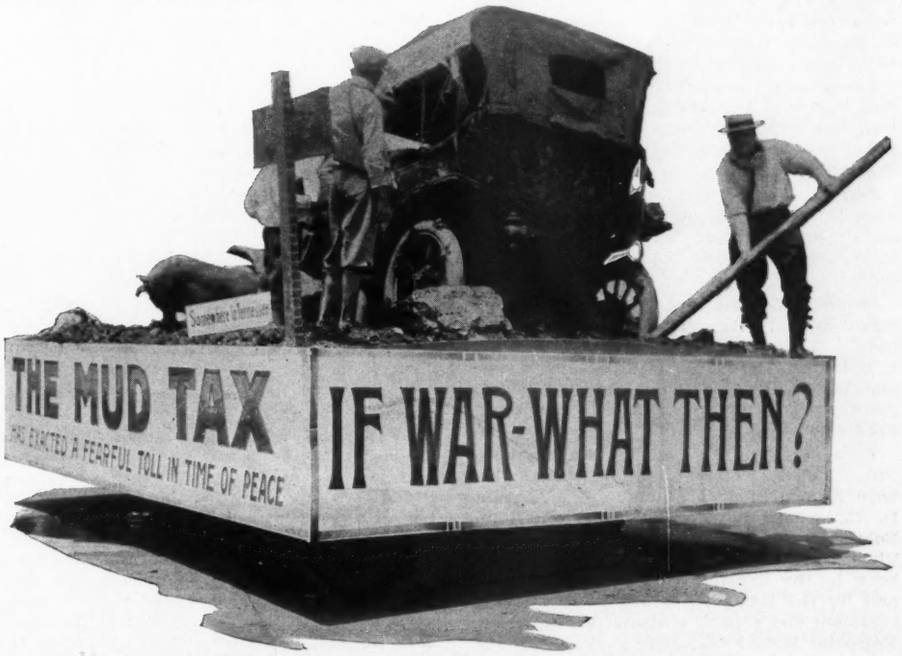
New York—Acker & Lyle; to manufacture and deal in motor cars; capital stock, $125,000; incorporators, Franklin Acker, T. K. Lyle, Mary C. Lyle, A. W. Acker.

Norfolk, Va.—Norfolk Motorist Supply Co.; capital stock, $1,000; incorporators, L. L. Smith, G. M. Smith.

Reading, Pa.—Heydt Motor Co.; to purchase, sell, exchange and repair motor cars; incorporators, P. L. Bell, E. L. Auman, I. M. Heydt.

Schenectady, N. Y.—Indiana Garage Co.; garage repairs; capital stock, $12,000; incorporators, W. H. Noonan, P. J. Ostringer, W. J. Fitzpatrick.

Toledo, O.—Wolverine Automobile Co.; capital stock, $175,000; incorporators, Albett H. Collins.



Dixie highway float in Chattanooga, Tenn., preparedness parade

Among the Makers and Dealers

EATS COAL, SPITS SMOKE AND—ER, YOU 'ORTER SEE IT—Could Barnum have just come to life for a moment and stationed himself in the heart of the business section of Anderson, S. C., recently, he would have seen a spectacle that completely put to rout all of Edison's forecasts of future inventions—yea, verily, it would have made the Circus King shed bitter tears to think he had missed a parade feature that would have made all past street demonstrations look like a corner-singing girl with a cheap brass tambourine. Sylvester Williams, wife and daughter, descendants of Ham, floated into town in a veritable blaze of glory. Old inhabitants vowed the like had never been seen, and the negroes stood about gaping and speechless with wonder. Williams planned, built and caused to run a gasolineless buggy that makes the comic tale of the would-be-kerosene-buggy read like a slavery time story of a cart drawn by a sleepy oxen.

Built on the remains of a cast-off Brush, run by a 10-horsepower steam engine, given life and sustenance in the form of coal fed from the front seat and water supplied from a 10-gallon beer keg attached to the back of the "float," is the description given of the mechanism of the buggy-wonder by one who surveyed the ambitious young car with a critical eye.

P. S.—It can make 25 miles per.

O-SO-EZY Changes Name—The O-So-Ezy Mop Co., Detroit, Mich., has changed its name to O-So-Ezy Products Co.

Thorpe N. A. T. A. Assistant Manager—J. C. Thorpe, Urbana, Ill., now is assistant manager of the National Automobile Trade Association, Chicago.

Evans with United Truck—E. C. Evans, formerly with the Packard Motor Car Co., Detroit, Mich., has been appointed production manager of the United Motor Truck Co., Grand Rapids, Mich.

Sewell Opens Baltimore Branch—The Sewell Cushion Wheel Co., Detroit, Mich., has opened a branch at Baltimore, Md., and O. H. Jones has been appointed manager of the branch.

Organize Demountable Wheel Company—The Simplicity Demountable Wheel Co. has been organized by Frederick W. French and I. Bates and is operating at 412 Bond avenue, N. W., Grand Rapids, Mich. The company manufactures regulation wheels for Ford cars.

T. V. T. Corp. to Open in Washington—The T. V. T. Motors Corp., New York, has been formed to do business in Washington, D. C., where it will handle the Scripps-Booth, Marmon and Isetta-Fraschini. G. N. Thurber, president of the corporation, has been in the industry for the last 16 years and for the last 4 years has been the vice-president and general manager of the Isotta-Fraschini Motors Co., New York, distributor for the Scripps-Booth and sole importer of the Isotta-Fraschini. Prior to this Mr. Thurber was the manager of the motor car department of J. M. Quinby & Co, Newark, N. J., body builder.

Perma-Loc to Make Patches—A charter was granted last week to the Perma-Loc Mfg. Co., Wilkes-Barre, Pa. The corporation is capitalized at $10,000 and will engage in the manufacture and sale of tire patches.

Dann Insert Factory at Cleveland—To accommodate the increased production of Dann Insert, a large plant has been arranged for in Cleveland, O., and thousands of service stations are being established everywhere throughout the United States.

Baush Machine at Detroit—The Baush Machine Tool Co. has opened an office at Detroit, Mich., in the Dime Bank building. W. Wetsel, who has been associated with the company for some time, will be in charge.

Ford "Over on Broadway"—For a healthy consideration the Ford Motor Co. has secured a slice of Broadway in New York in the heart of the motor car district. The property is on the northwest corner of Broadway and Fifty-fourth, and it is intended to erect a salesroom and service station there. It is stated that negotiations are being carried on for the tentative idea of erecting a sixteen-story building on the site, the upper floor of which will be used as a hotel. It is reported that if the deal goes through the hotel will be an annex to the Woodward, which the property adjoins, and it is suggested that the name might be the Detroit-Woodward Hotel.

Former Mayor Sells Cars—S. J. Ward, ex-mayor of Rosebud, Tex., has accepted a position with the Morris Automobile Co., Dallas distributor for the Chevrolet.

Gundrum Bell Traffic Manager—H. F. Gundrum, of York, Pa., formerly connected with the traffic department of the Pullman Motor Car Co., has been made traffic manager of the Bell Motor Car Co. Prior to his going with the Pullman company he was the agent for the Western Maryland Railway Co. in York.

New Buffalo Organization—The Buffalo Automobile Service Association, Inc., Buffalo, N. Y., has been formed. James Barclay is president of the association and Dr. Knoll is the vice-president. The new association is a member of the New York State Automobile Association and the American Automobile Association. This new organization makes the 109th club of the New York State Automobile Association.

Chrysler Leaves General Motors—Walter Chrysler, who has supervised the manufacturing and production departments of the Briscoe Motor Co., has tendered his resignation following the resignation of C. W. Nash as president of General Motors. Nothing has yet been given out regarding Mr. Chrysler's future plans, nor as to who his successor will be. Mr. Chrysler is regarded as one of the foremost production men in the industry and has had much to do with

the remarkable expansion and growth of the Buick factories.

Stephens Short of Help—M. A. Steele, Freeport, Ill., manager of the Stephens Motor branch of the Moline Plow Co., says his company could give employment to 100 more mechanics if they could be secured. The company plans to turn out ten complete cars each day, but has been handicapped by lack of sufficient men. Material is also coming in slowly.

Queen to Drive King—The Queen will drive a King, but in this case it will be an eight-cylinder King and the owner will be Queen Alexandria of Denmark. The King Motor Car Co., Detroit, Mich., through its Denmark distributor, P. Matthiesen, has just received an order for one of the standard five-passenger, eight-cylinder King sedans for the use of her royal highness.

Motor Products Directors Announced—The board of directors of the Motor Products Corp, New York, will be composed as follows: W. C. Rands, D. B. Lee, C. F. Jensen, all of Detroit; H. H. Seeley, Ann Arbor, and Sol Wexler of J. S. Bache & Co. W. C. Rands will be president. The tangible assets of the corporation aggregate over $2,500,000, equal to $35 per share of stock.

Darky Won't Be Fired—R. L. Cameron, King dealer at Dallas, Tex., has a faithful old darky who has been in his employ since the days of the one-cylinder car. The darky was reprimanded because of carelessness which ended in Mr. Cameron ordering him discharged. Toward evening he shied up to Mr. Cameron and exclaimed: "No, siree; I ain't going to leave. I done started with you and I'm done going to finish with you."

Overland Branch in Dallas—The Willys-Overland Co., Toledo, O., through Zone Manager W. P. Sapp, has leased a two-story building in Dallas, Tex., as a wholesale office and distributing point for the Southwest. The Willys-Overland Co., according to announcement of Mr. Sapp, will occupy the building about August 1 and will install a stock of parts and accessories amounting to a value of about $150,000.

New Spark Plug Company—The Wolverine Spark Plug Co., a newly incorporated concern, with a capital of $100,000, has located at Detroit, Mich. New equipment is now being installed to manufacture in large quantities a new spark plug called the P. D. Q. The officers and directors of the company include C. H. Braselton, president; A. Eugeman, vice-president, and P. S. Linton, secretary and treasurer; also F. R. Pence and William Bohleber.

King Establishes New York Branch—The King Motor Car Co., Detroit, Mich., has bought out the King holdings of the A. Elliott Ranney Co., New York, and now is managing the sale of the King eight at Broadway and Fifty-second street. At the present time the business is being handled by factory representatives under the direction of Joseph Porter. The service department will be located at 250 West Fifty-fourth street.

Scharps Is Promoted—C. E. T. Scharps, who recently joined the C. T. Silver Motor Co., New York, as advertising manager and assistant to Mr. Silver, has been promoted to the position of manager of the Newark, N. J., branch. Mr. Silver, who handles the Overland, Willys-Knight and Peerless business in that territory, has also made G. Franklin Bailey director of branches. W. E. White has been put in charge of the service department.

"Ambiwheelerous" Truck—"Ambiwheeler-" ous is a new word just coined by the Tucson, Ariz., Citizen to designate the type of motor truck that drives, brakes and steers on all four wheels. The term was suggested by the word ambidexterous. The Citizen was commenting on the growing use of Jeffery Quads by mine operators in Arizona, and after wrestling with such terms as "all-drive," "four-wheel-drive-brake-and-steer" and other inelegant expressions the editor went Noah Webster one better.

New Firestone Branch Building—Bids have been called for for the erection of a new building by the Firestone Tire and Rubber Co. for its Los Angeles branch. The building is to be a two-story structure, located on the corner of Figuroa and Twelfth streets with 155 feet frontage on each street.

Prizes for Initiative—A series of cash prizes is being offered by the Auto Parts Co., Providence, R. I., maker of the Apco line of specialties for the Ford car, for the best short sales suggestion, story, joke, poem, photograph, shop kink, etc., containing the name of Ford. The first prize is $5, the second $3 and the third $2. There are 15 $1 prizes. The only restrictions are that the name Ford is used and the copy written on one side of the paper.

Du Pont Buys Fairfield—The Du Pont Fabrikoid Co., Wilmington, Del., has purchased the Fairfield Rubber Co., with plants at Fairfield, Conn. The Fairfield company manufactures a coated textile similar to Fabrikoid, and is used extensively by motor car and carriage manufacturers. All the present employees will be retained, the change affecting only the owners. The company will not consolidate with the purchasers, but will continue as the Fairfield Rubber Co., endeavoring to uphold, if not better the present standard of its product. J. K. Rodgers, sales manager of the Du Pont Fabrikoid Co., will act in the same capacity for the Fairfield company.

To Make Vulcanizers—A new factory for the manufacture of vulcanizing machinery was opened last week at Canton, Ill. The company in charge comprises F. A. Whitten, Charles Palmer and Abe Lewis. The machine produced is a timely invention. By a simple chemical process owners are said to be able to repair a break in a tire within 5 minutes and without danger of burning the rubber. The operations of the company will be on a small scale at the outset, but it is planned to expand as business warrants.

Tire Company to Refund—Stockholders numbering nearly two hundred of the Toledo-Findlay Tire & Rubber Co. met at Findlay, O., last week and agreed to refund the bonus stock issued them when the company was organized several years ago. This is done in order that the company may be put on a sound financial basis. There was only one dissenting vote. The affairs of the company have been in the hands of the sheriff for several months. The company has many orders and good prospects.

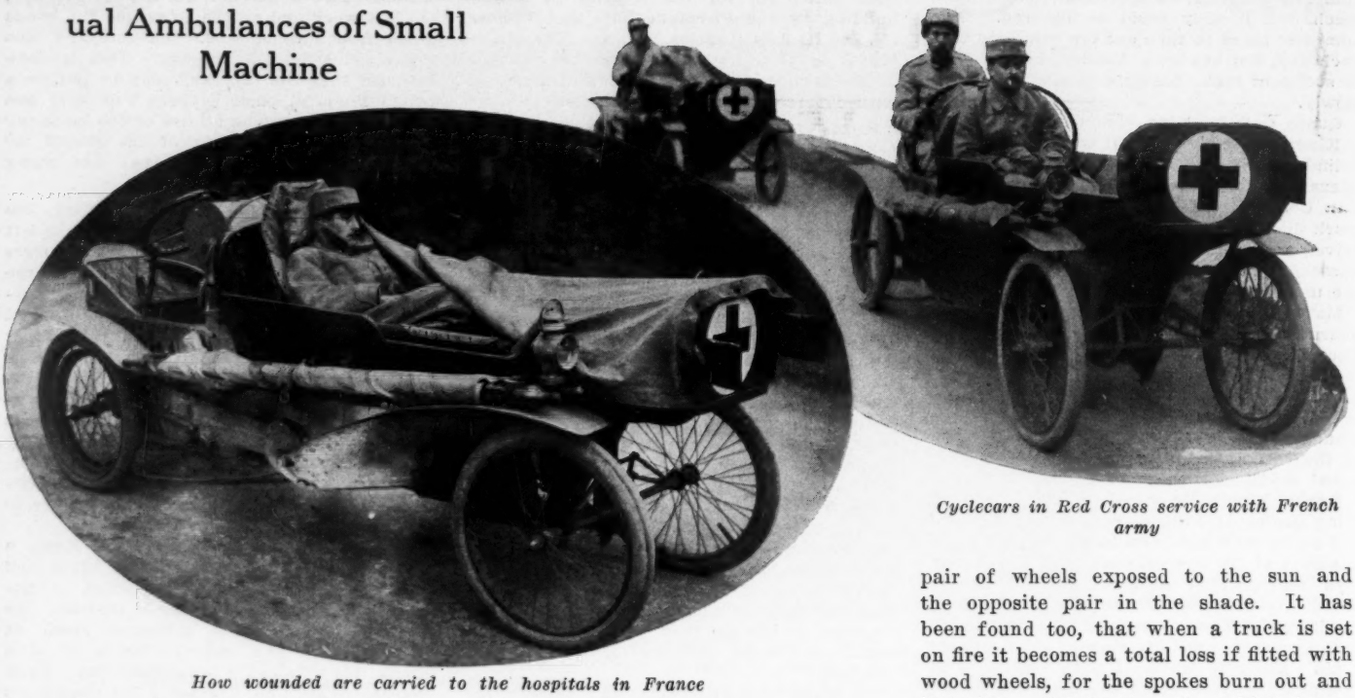
Durant Makes Change—R. C. Durant, Los Angeles, Cal., son of W. C. Durant, has left Los Angeles and will make his headquarters at Oakland, Cal., where he will have charge of the Chevrolet assembling plant with Norman De Vaux. De Vaux and young Durant have the Chevrolet distribution throughout California, Oregon, Washington, Idaho, Arizona and Nevada. The Chevrolet Motor Co. of California, incorporated for $600,000, owns the assembling plant at Oakland, which is the largest factory on the coast. Until June 10 Durant had charge of the wholesale interests of the Chevrolet in southern California, while De Vaux managed the affairs in the north.

Halts U. S. L. Stock Sale—F. A. Bagg, a stockholder of the United States Light and Heat Corp., New York, has filed in the supreme court an action to restrain the directors from selling preferred stock at $4.50 a share and common stock at $2 a share. He obtained a temporary stay. Bagg charges waste and misuse of the company's funds by the officers and majority directors of the corporation. The defendants include J. A. Smith, president; E. H. Gold, vice-president; C. L. Lane, secretary, and A. H. Ackerman, treasurer. It is alleged they are about to sell $290,000 of preferred and $250,000 common stock at the above prices, which prices are about $1 less than the market.

STEEPLEJACK WANTS CAR THAT CAN CLIMB—The ordinary human being, when deciding on a motor car, may be content with a car that is merely an ordinary climber. But when a steeplejack wants a car, he wants one that has something of his own ability in it. He wants a car that can climb anything. Harry Gardiner, known by all his fellow-citizens in Kansas City as "the human fly," because of his uncanny ability to scale the sides of the tallest buildings, has purchased a Maxwell. But he didn't buy until he was satisfied that the car could climb. To convince Mr. Gardiner the salesman drove the car to Kansas City's famous Colonnade, which boasts twenty steep steps. Mr. Gardiner insisted on being a passenger during the ride up the steps. He was.

France Uses Cyclecars to Carry Its Wounded from Field

Red Cross Service Makes Individual Ambulances of Small Machine



How wounded are carried to the hospitals in France

Cyclecars in Red Cross service with French army

CONVERTABLE cyclecars are now being made use of in the French army as an auxiliary to the Red Cross service. The regulation motor ambulances carrying four men lying are unable, owing to their size and weight, to get close to the first aid dressing station. Thus wounded men have to be first brought to the rear on stretchers before they can be placed in the motor ambulances. Experiments which have been carried out in the Soissons district with Bedelia twin-cylinder air-cooled cyclecars show that these machines can travel as far forward as the stretcher men can penetrate, and that they can bring wounded cases back much quicker than it is possible to do it by hand. As there is no fear of a machine getting into a position from which it cannot be extricated by a few willing helpers, the driver of a cyclecar does not hesitate to go forward where a motor ambulance driver would hold back.

The machines are twin tandem seaters, with the motor in front and the driver at the rear. Only one wounded man is carried at a time. The stretcher is placed on the top of the body and attached to it by coil springs, so as to give additional comfort, the wounded man having his head towards the rear and his feet over the motor. When weather conditions require, he can be completely covered with a canvas top mounted on a rigid frame.

In the Vosges mountain district motorcycles and sidecars are made use of for bringing in wounded men from places inaccessible to the big automobile ambulances. On these mountain passes it is often necessary to travel over mule tracks where there is not sufficient width for an automobile and where the soft earth would not carry their weight. The motorcycles do this work efficiently. Although not an easy matter, means have been found to place a stretcher on the side car so as to handle serious cases.

Wood Wheels and War

It is said that the war has been responsible for the almost complete elimination of the wood artillery wheel. For truck service the cast steel wheel is generally employed by the French and Italian armies. The British, while large users of cast steel wheels, also employ a percentage of disk wheels. For ambulance service and light trucks, particularly those with twin pneumatics at the rear, the steel disk wheel is in a decided majority. American trucks brought into Europe for army service are fitted with wood wheels.

Fiat, one of the largest manufacturers in Europe, and certainly the largest in Italy, uses no wood wheels. Heavy trucks are fitted with cast steel wheels, ambulances and light trucks on pneumatic tires with steel disk wheels, and lighter touring cars with Sankey steel wheels. Renault, the biggest manufacturer in France, has ceased to use wood for commercial vehicles, although employing it for touring cars.

The advantage of the metal wheel over wood is that it requires no attention. This is particularly important on military service, where trucks have to do a very great variety of work. While some trucks may have to run daily on a fixed schedule, many others have to stand for weeks by the roadside fully loaded, probably with one pair of wheels exposed to the sun and the opposite pair in the shade. It has been found too, that when a truck is set on fire it becomes a total loss if fitted with wood wheels, for the spokes burn out and it is impossible to tow the vehicle home. If fitted with metal wheels the truck can always be salvaged. In most cases a burned-out truck can be put into condition at comparatively small cost, provided it can be towed to the repair shop.

Traveling Stores With Allies

Well equipped department store trucks from which commodities are sold to troops along the front are now an established feature of the French army. The high cost of living in France is most severely felt by men in the active army, for they are obliged to purchase at the few village stores open just behind the lines, and have to pay the fancy prices imposed on the plea of high freight, danger and scarcity. It was in order to remedy this unsatisfactory condition that the military authorities fitted up a certain number of Peugeot 3½-ton trucks as general stores, and sent them out to travel among the various armies in the field. All kinds of necessary articles likely to be required by men in the field—candles, soap, shoe laces, towels, paper, ink, shirts, socks, brushes and simple medicaments—are to be found aboard these traveling stores and are sold at practically cost price. These trucks have definite routes through the small towns and villages in which troops are quartered during their rest periods from service in the trenches. At first adopted as an experiment, this service has proved an immense success and has been extended to the whole of the French army.

Recently the French authorities decided to equip and send to the front a series of cars specially equipped for giving shower baths, hot baths, for disinfecting clothing, and for washing linen.